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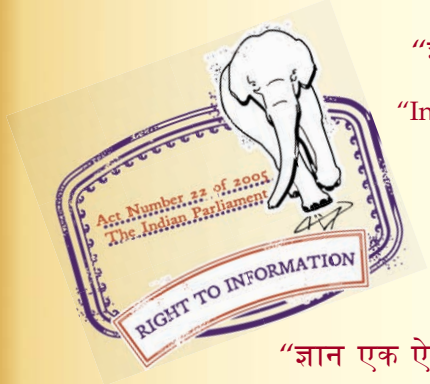

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IS : 8187 - 1976

Indian Standard
SPECIFICATION FOR D-TYPE FUSES

UDC 621·316·923

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

March 1977

AMENDMENT NO. 1 OCTOBER 1980

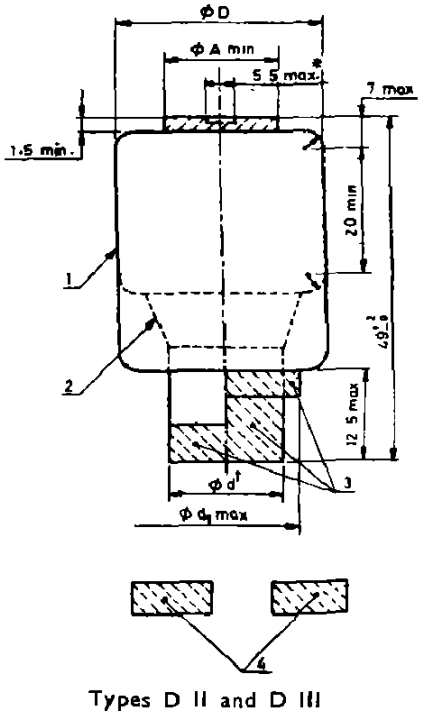
TO

IS : 8187-1976 SPECIFICATION FOR D-TYPE FUSES

Alterations

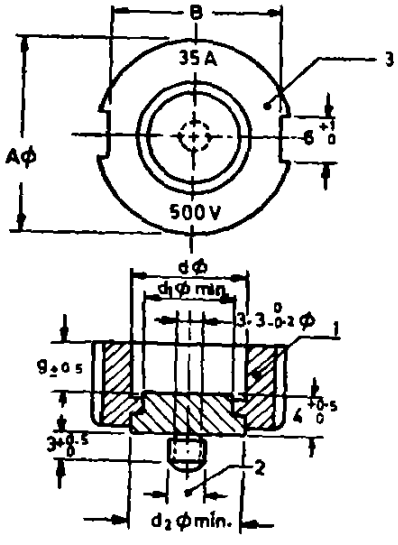
(*Page* 3, *clause* **0.3**, *line* 3) — Substitute ' Table 31 ' *for* ' Table 1 '.

(*Page* 40, *Table* 9, *figure of fuse-links of* ' *Types* D II *and* D III ') — Substitute the following for the existing figure:



Types D II and D III

(*Page* 42, *Table* 10, *figure of gauge piece of* ' *Types* D II *and* D III ') — Substitute the following for the existing figure:



Types D II and D III

(*Page* 45, *Table* 11, *col* 8, *last entry*) — Substitute ' 30 95 ' *for* ' 30 05 '.

(*Page* 60, *Table* 27, *col* 2, *fifth entry*) — Substitute ' 650 ' *for* ' 450 '.

(ETDC 57)

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Indian Standard

SPECIFICATION FOR D-TYPE FUSES

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 23 July 1976, after the draft finalized by the Switchgear and Controlgear Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard covers the requirements for D-type fuse-links as well as fuse-holders. These fuses are used in both domestic and industrial installations.

The fuse-links, fuse-bases, fuse-carriers and gauge-pieces may be made by different manufacturers. However, this standard will ensure the interchangeability between the different parts of D-type fuses manufactured by different manufacturers.

0.3 Fuses covered by this standard are primarily intended for the protection of wiring in installations where the maximum prospective current does not exceed the values specified in Table 1. For applications involving higher breaking capacities, manufacturers may be consulted.

0.4 This standard, shall be read in conjunction with IS : 2208-1962* and IS : 3106-1964†, which gives information on the general aspects, application and installation of fuse-links.

0.5 *In* preparing *this* standard, assistance has been derived from the following:

CEE Publication 16 (1970) 'Fuses for domestic and similar purposes', International Commission on Rules for the Approval of Electrical Equipment.

IEC Publication 241(1968) 'Fuses for domestic and similar purposes', International Electrotechnical Commission.

IEC Publication 269-1(1968) 'Low voltage fuses, Part 1 General requirements'. International Electrotechnical Commission.

IEC Publication 269-2 (1973) 'Low voltage fuses, Part 2 Supplementary requirements for fuses for industrial applications'. International Electrotechnical Commission.

*Specification for HRC cartridge fuse-links up to 650 V.

†Code of practice for selection, installation and maintenance of fuses (voltage not exceeding 650 volts).

IEC Publication 269-3 (1973) 'Low voltage fuses, Part 3 Supplementary requirements for fuses for domestic and similar applications'. International Electrotechnical Commission.

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard covers D-type fuses for domestic and similar general purposes, with a rated voltage up to and including 500 V and a rated current not exceeding 100 A.

1.2 This standard does not cover fuses intended for the protection of semiconductor devices.

2. TERMINOLOGY

2.0 For the purpose of this standard, the definitions given in IS : 1885 (Part XVII)-1969† and the following, shall apply.

2.1 D-Type Fuse — A non-interchangeable fuse comprising a fuse-base, a screw-type fuse-carrier, a gauge-piece and a fuse-link.

2.2 Fuse-Base for Panel Mounting — A fuse-base having live parts which are accessible, even when mounted and wired as in normal use, complete with a gauge-piece, a fuse-link and a fuse-carrier in position, the protection against electric shock being given by shielding the live parts after installation by means of a separate cover.

NOTE — A fuse-base for back connection need not be a fuse-base for panel mounting.

2.3 Gauge-Piece — The part of the fuse, which is designed to prevent the use of a fuse-link having a rated current higher than that corresponding to the gauge-piece.

2.4 Fuse-Indicator — A device intended to show whether or not the fuse-element has operated.

2.5 Rated Current of a Fuse-Link

2.5.1 The current assigned to the fuse-link by the manufacturers.

2.5.2 The rated current of a fuse-link is the current that the fuse-link may carry continuously without deterioration under the conditions specified, when it is placed in the fuse-carrier for which it is designed and when the latter is screwed home into the fuse-base.

*Rules for rounding off numerical values (*revised*).

†Electrotechnical vocabulary: Part XVII Switchgear and controlgear

2.6 Rated Current of a Fuse-Base, a Fuse-Carrier, or a Gauge-Piece

2.6.1 The current assigned to the relevant part by the manufacturer.

2.6.2 The rated current of the relevant part is the highest rated current in the range of fuse-links with which that part is intended to be used.

3. STANDARD RATINGS

3.1 The standard rated voltages shall be 415 and 500 volts.

3.2 The standard rated currents shall be as follows:

a) For fuse-bases and fuse-carriers — 25, 63 and 100 A
b) For fuse-links and gauge-pieces — 0·5, 1, 2, 4, 6, 10, 16, 20, 25, 35, 50, 63, 80 and 100 A.

NOTE — 0 5 and 1A are not preferred ratings.

3.3 Fuse-links having a rated current not exceeding 63 A shall be suitable for both ac and dc.

3.3.1 Fuse-links having a rated current exceeding 63 A, may be suitable for both ac and dc, for ac only or for dc only.

3.3.2 Fuse-bases, fuse-carriers and gauge-pieces are deemed to be suitable for both ac and dc.

4. CONSTRUCTION

4.1 Fuses shall be so designed and constructed that in normal use their performance is reliable and without danger to the user or surroundings. They shall pass the tests specified in **7**.

4.1.1 The main insulating parts of fuse-bases, fuse-carriers and gauge-pieces and the container of the fuse-links shall be made of ceramic material. Compliance shall be checked by inspection and, if necessary, by the relevant tests specified in **7**.

4.2 Construction of Fuse-Bases

4.2.1 Fuse-bases shall be so designed that they shall be securely fixed in such a way that their removal requires the use of a tool.

4.2.2 Fuse-bases other than those designed for mounting directly on bus-bars or the like, shall be suitable for mounting on a flat surface.

4.2.3 Fuse-bases shall be so constructed as to permit the conductors to be introduced into the terminals and to be secured therein after having fixed the fuse-base to a support, in addition, the terminals shall be so located that, after the conductors have been correctly fitted, there is no risk of their bridging the fuse-link.

4.2.4 The cover shall be firmly fixed in such a way that it may not be rotated and may only be removed with the aid of a tool.

The cover shall withstand the mechanical stresses imposed during fixing.

NOTE — This requirement does not exclude fuse-bases for panel mounting provided with parts which may be removed without the aid of a tool if when installed, they are covered by a shield which requires the use of a tool for its removal.

4.2.5 Fuse-bases for front connection shall be designed according to Tables 2 and 3 and shall be so constructed that the screwed shell is in one piece with its contact strip unless the design is such that movement of this strip with respect to the shell is not possible and that the screwed shell and both contact strips are securely fixed to the fuse-base.

Fuse-bases for back connection shall be designed according to Table 4 and shall be so constructed that the screwed shell and both contact strips are securely fixed to the fuse-base.

4.2.6 Terminal studs of fuse-bases according to Table 4 shall be brazed or welded to the fuse-base contacts and shall be secured against lateral displacement, unless the connection is not subject to torsion while fitting the conductors.

4.2.7 The part of the bottom contact strip inside a circle concentric with the hole for fixing the gauge-piece, as indicated by hatching in the plan views of Tables 2 and 3 shall have a plain and unbroken upper surface at the required level, the edge of the hole for fixing the gauge-piece having no burrs and no projections of any kind above this level within the hatched area.

NOTE — This requirement does not preclude the presence of holes through the material within the hatched area.

4.2.8 If the required length of thread in the hole for fixing the gauge-piece is obtained by plunging, the edge of the extrusion shall be reasonably smooth.

4.2.9 *Terminals of Fuse-Bases*

4.2.9.1 Fuse-bases shall be provided with terminals in which connection is made by means of screws or nuts. The means for clamping the conductors shall not serve to fix any other component. Screws and nuts for clamping the conductors, including studs for back connection, shall have ISO metric screw threads (*see* IS : 4218*).

NOTE — The requirement with regard to the means for clamping the conductors does not exclude fuse-bases designed for mounting directly on bus-bars and in which the same means serve for fixing and for connection.

4.2.9.2 Terminals intended for the connection of external conductors shall allow the connection of conductors having nominal cross-sectional areas as shown in Table 5.

4.2.9.3 For fuse-bases for panel mounting, terminals not intended for the connection of external conductors shall allow the connection of conductors having nominal cross-sectional areas as shown in Table 6.

*ISO metric screw threads.

4.2.9.4 Terminals shall comply with Table 7.

If the required length of thread in a terminal screw hole is obtained by plunging, the edge of the extrusion shall be reasonably smooth and the length of thread shall exceed the specified minimum value by at least 0 5 mm. The length of the extrusion shall be not more than 80 percent of the original thickness of the metal, unless the mechanical strength is adequate with a greater length.

NOTE — Terminals other than shown in Table 7 can also be used.

4.2.9.5 Terminals shall be so fixed that when the clamping means is tightened or loosened, the terminal does not work loose.

Covering with sealing compound without other means of locking is not deemed to be sufficient.

NOTE — Terminals may be prevented from working loose by fixing with two screws or by fixing with one screw, provided that any appreciable movement is prevented by a recess or other suitable means.

4.2.9.6 Terminal studs for back connection shall be provided with means for securing the nut for clamping the conductors, and they shall be securely fixed to the fuse-base contacts.

4.2.9.7 Terminal shall be so designed that they clamp the conductor between metal surfaces with sufficient contact pressure and without damage to the conductor.

4.2.9.8 Terminals other than those intended for the connection of conductors by means of cable lugs or bars only, shall not require special preparation of the conductor in order to effect correct connection, and they shall be so designed or placed that the conductor may not slip out when the clamping screws are tightened.

NOTE 1 — The term 'special preparation of the conductor' covers soldering of the strands, use of cable lugs, formation of eyelets, etc, but not the reshaping of the conductor before its introduction into the terminal or the twisting of a stranded conductor to consolidate the end.

NOTE 2 — The conductors are considered to be damaged if they show sharp indentations.

4.3 Construction of Fuse-Carriers

4.3.1 The screwed shell shall be provided with means for retaining the fuse-link in position and free from burrs on the contact surface, and also securely fastened to the insulating cap.

4.3.2 Fuse-carriers shall be provided with a suitable aperture for observing the fuse indicator of the fuse-link. This aperture shall be closed by a securely fixed window of glass, mica or similar transparent material.

4.4 Construction of Gauge-Pieces

4.4.1 Gauge-pieces having a rated current not exceeding 63 A shall be so constructed that the current-carrying parts are in one piece and that they withstand the mechanical stresses occurring in normal use.

4.4.2 The metal part of gauge-pieces having a rated current not exceeding 63 A shall have on both sides smooth contact surfaces without burrs within the prescribed area, and both the surfaces shall protrude from the adjacent ceramic material.

4.4.3 The part forming the calibration ring shall be of ceramic material.

4.5 Construction of Fuse-Links

4.5.1 Fuse-links shall contain only one fuse-element, which shall be directly connected to both contacts.

NOTE — This requirement does not preclude fuse-links containing fuse-elements consisting of more than one wire or strip connected in parallel

4.5.2 Fuse-links shall be of the enclosed type and shall be so constructed that it is not possible to remove the contacts by hand or to replace parts ensuring the non-interchangeability without damaging the fuse-link beyond repair.

4.5.3 Fuse-links shall be provided with a fuse indicator visible when the fuse-link is placed in a fuse-carrier. The fuse indicator shall operate satisfactorily down to a voltage of 100 V.

Compliance shall be checked by the tests specified in **7.12.6** and **7.12.7**

4.5.4 Contacts shall be so designed that they provide and maintain electrical contact. They shall be nickel-plated or be otherwise equally protected.

5. REQUIREMENTS

5.1 Non-interchangeability and Dimensions

5.1.1 Fuses shall be so designed that a fuse-link shall not be replaced by a fuse-link having a higher rated current without changing the gauge piece.

NOTE 1 — This requirement does not apply when the higher rated current does not exceed 6 A.

NOTE 2 — For fuses not complying with the dimensions given in appropriate tables of this standard, compliance shall be checked by inspection of drawings, taking into account the effect of tolerances and by checking the samples against these drawings.

NOTE 3 — Conformity to the dimensions specified in **5.1.2** ensures compliance with this requirement.

5.1.2 The dimensions of fuses shall be in accordance with the appropriate tables specified below:

a) Fuse-base for front connection 25 A and 63 A	Table 2
b) Fuse-base for front connection 100 A	Table 3
c) Fuse-base for back connection	Table 4
d) Fuse-carrier	Table 8
e) Gauge-piece	Table 9
f) Fuse-link	Table 10
g) Edison thread E 27 and E 33	Table 11

h) Whitworth thread — Table 12

j) Fastening thread — Table 13

NOTE 1 — Deviation from the dimensions specified in Tables 2 to 13 may be made, but only if they provide a technical advantage and do not adversely affect the purpose and safety of fuses complying with the tables at the end of this standard especially with regard to interchangeability and non-interchangeability.

NOTE 2 — Fuses with such deviations shall, however, comply with all other requirements of this specification as far as they reasonably apply.

5.2 Protection Against Electric Shock

5.2.1 Fuses shall be so designed that live parts are not accessible when the fuse base is mounted and wired as in normal use, complete with a gauge-piece, a fuse-link and a fuse-carrier in position.

With the exception of the fuse-carrier, parts providing protection against accidental contact with live parts shall not be removable without the aid of a tool.

NOTE 1 — Compliance with the tables specified in **5.1.2** ensures that the live parts in the gap between the fuse-carrier and the fuse-base are inaccessible when the fuse-carrier has been screwed home.

NOTE 2 — For fuse-bases for panel mounting, the requirement with regard to inaccessibility does not apply to parts intended to be shielded when the fuse is installed.

NOTE 3 — Fuses which are evidently intended for surface mounting shall comply with the requirements with regard to the protection against electric shock. Fuses not complying with these requirements are deemed to be intended for panel mounting.

5.2.2 Fuses shall be so designed that fuse-links may be replaced without touching live parts.

5.2.3 Cover fixing screws other than those shielded when the fuse is complete with a gauge-piece, a fuse-link and a fuse-carrier in position, shall not be live.

5.3 Moisture Resistance — Fuses shall be proof against humid conditions which may occur in normal use. They shall pass the test specified under **7.9.**

5.4 Insulation Resistance and Electric Strength — The insulation resistance and the electric strength of fuses shall be adequate. They shall pass the test specified under **7.10.**

NOTE — Fuse-links and gauge-pieces are not subjected to these tests.

5.5 Heating — Fuses shall be so constructed that the contacts are not subjected to excessive heating in normal use. Compliance shall be checked by the test specified under **7.11.**

5.6 Fusing Characteristics — The fusing current of fuse-links shall be appropriate both for large and short operating times. Compliance shall be checked by the tests specified under **7.12.**

5.7 Breaking Capacity — Fuse-links shall operate satisfactorily when loaded with any current between their minimum fusing current and their rated

breaking capacity, without damaging the fuse or causing danger to the surroundings. Compliance shall be checked by the tests specified under **7.13.**

5.8 Resistance to Heat and Fire

5.8.1 Fuse-bases, fuse-carriers, fuse-links and gauge-pieces shall be sufficiently resistant to heat. They shall pass the tests as specified under **7.14.**

5.8.2 External parts of insulating material shall be resistant to abnormal heat and to fire. They shall pass the test as specified under **7.14.**

5.9 Mechanical Strength of Fuse-Links — Fuse-links shall have adequate mechanical strength and their contacts shall be securely fixed. Compliance shall be checked by the test specified under **7.15.**

5.10 Creepage Distances, Clearances and Distances Through Sealing Compound

5.10.1 Creepage distances, clearances and distances through sealing compound shall not be less than the values specified in Table 14.

5.10.2 Sealing compound shall not protrude above the edge of the cavity in which it is contained

5.11 Screws, Current-Carrying Parts and Connections

5.11.1 Connections, electrical or otherwise, shall withstand the mechanical stresses occurring in normal service. Screws transmitting contact pressure and screws which are operated during the installation of the fuse, shall screw into a metal nut or metal insert.

Compliance shall be checked by inspection and by the test specified in **7.17.**

NOTE — Screws or nuts which are operated during the installation of the fuse include terminal screws or nuts, screws for fixing covers, etc, but not screws for fixing the fuse-base to the supporting surface.

5.11.2 Screws and rivets which serve as electrical as well as mechanical connections, shall be locked against loosening.

Compliance shall be checked by inspection and by manual test.

NOTE 1 — Spring washers may provide satisfactory locking. For rivets, a non-circular shank or an appropriate notch may be sufficient.

NOTE 2 — Sealing compound provides satisfactory locking only for screw connections not subject to torsion in normal use.

5.11.3 Current-carrying parts, other than fuse-elements and protective coatings, shall be of copper or an alloy containing at least 50 percent copper for cast parts or parts made from brass bar, and at least 58 percent copper for parts made from rolled sheet, except that contacts of fuse-links and screwed shells of fuse-carriers and fuse-bases shall contain at least 62 percent copper.

Compliance shall be checked by inspection and by chemical analysis.

NOTE — This requirement does not apply to screws, nuts, washers, clamping plates and similar parts of terminals.

5.11.4 Contacts shall be so designed that they provide and maintain adequate electrical contact. They shall be nickel-plated or be otherwise at least equally protected.

5.12 Resistance to Rusting — Ferrous parts shall be adequately protected against rusting.

Compliance shall be checked by the test specified under **7.18**.

6. MARKING

6.1 Fuse-Bases — Every fuse-base shall be clearly and indelibly marked with the following particulars:

a) Rated current in amperes,
b) Rated voltage in volts,
c) Manufacturer's name and/or trade-mark, and
d) Type reference.

6.1.1 Marking shall be on the main part and the marking for rated current, rated voltage and manufacturer's name or trade-mark shall be discernible from the front when the fuse-base is mounted and wired as in normal use, but not fitted with a fuse-carrier, a fuse-link or a gauge-piece, if necessary after removal of the cover.

6.2 Fuse-Carriers — Every fuse-carrier shall be clearly and indelibly marked with the following particulars:

a) Rated current in amperes,
b) Rated voltage in volts, and
c) Manufacturer's name and/or trade-mark.

6.2.1 The marking shall be on the main part and shall be discernible from the front when the fuse-carrier is screwed home into a fuse-base.

6.3 Gauge-Pieces — Every gauge-piece shall be clearly and indelibly marked with the following particulars:

a) Rated current in amperes, and
b) Manufacturer's name and/or trade-mark.

6.3.1 The marking for rated current shall be discernible from the front when the gauge-piece is fitted in a fuse-base, except that this marking may be at the back of gauge-pieces having a rated current exceeding 63 A.

6.3.2 In addition, the front surface of the gauge-piece shall be coloured as shown in Table 15.

NOTE — For gauge-pieces having a rated current not exceeding 6 A, the marking for rated current may be 0 5-6 A The marking shall be done in green colour.

6.4 Fuse-Links — Every fuse-link shall be clearly and indelibly marked with the following particulars:

a) Rated current in amperes;
b) Rated voltage in volts;
c) Manufacturer's name and/or trade-mark;
d) Type reference, if more than one type of time-lag or quick-acting fuse-link is included in the manufacturer's range, nature of supply, if the fuse-link is suitable for ac only or for dc only; and
e) Symbol for time-lag, if applicable.

6.4.1 In addition, the fuse-indicator of fuse-links shall be coloured as shown in Table 15.

6.5 Symbols — When symbols are used, they shall be as follows:

Amperes	A
Volts	V
Alternating current	∼
Direct current	⎓
Time-lag fuse-links	

6.5.1 For the marking of rated current and rated voltage, figures may be used alone. The figure for the rated current shall then be placed before or above the figure for the rated voltage, and separated from the latter by a line.

The recommended shape of the symbol for time-lag fuse-links is shown in Fig. 1.

NOTE — The marking for current and voltage may accordingly be as follows:

$$10\ \text{A}\ 500\ \text{V} \text{ or } 10/500 \text{ or } \frac{10}{500}$$

6.6 Compliance with the requirements of **6.1** to **6.5** shall be checked by inspection and by the test specified under **7.19**.

6.7 The fuse-bases, fuse-carriers, gauge-pieces and fuse-links may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

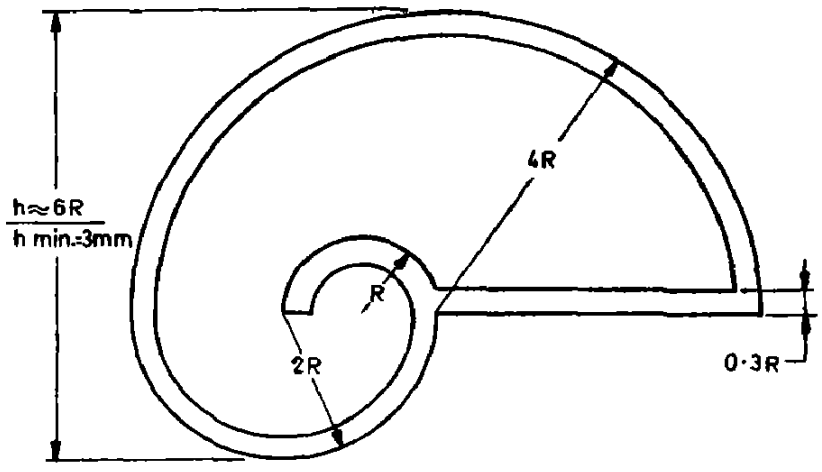


FIG. 1 RECOMMENDED SHAPE OF THE SYMBOL FOR TIME-LAG FUSE-LINKS

7. TESTS

7.0 General Conditions of Tests

7.0.1 Unless otherwise specified, the samples are tested as delivered and under normal conditions of use, at an ambient temperature of $27 \pm 5°C$.

7.0.2 Fuse-bases, fuse-carriers and gauge-pieces shall be tested separately.

7.0.3 Unless otherwise specified, fuse-links shall be tested in appropriate fuse-bases complying with the relevant table of this standard.

7.1 Type Tests

7.1.1 All tests of fuses specified in the following clauses shall be type tests. The purchaser shall accept certified copies of type tests as evidence of compliance of fuse-links with the requirements of the relevant clauses of this specification, and the manufacturer shall hold available originals of such certificates, detailed drawings of the fuses and a record of any alternations that may have been made in fuses subsequent to the type tests. The manufacturer shall, if required by the purchaser, certify that the fuses are identical in material and performance with those covered by a certificate of stated date.

7.1.2 The fuse-links to be used for the type tests shall be identical with those to be used in service in all of the following details:

a) Container, in all dimensions, material and process of manufacture;
b) Caps or other end-closure of container in dimensions and methods of attachment and sealing;

c) Granular filler of cartridge, in material, grain size and completeness of filling;

d) Any device provided for indication purposes;

e) Any high resistance or indicating component, fuse-element; and

f) Fuse-element in every respect.

7.1.3 The test of a fuse-link of any given rated current shall be deemed to prove fuse-links of the same standard size but of intermediate or lower rated current provided that points (a) to (e) of **7.1.2** are observed and the fuse-elements are identical in respect of length, form and materials, although their number or cross-sectional dimensions or both may be reduced.

7.1.4 For fuse-bases, fuse-carriers and gauge-pieces, the number of samples shall be three, all samples being subjected to all the tests. For fuse-links, the number of samples required for each of the tests is shown in Table 16.

7.1.5 The following shall comprise the type tests.

a) Tests for construction requirements of fuse-bases (*see* **7.3**),

b) Tests for terminals for fuse-bases (*see* **7.4**),

c) Tests for constructional requirements of fuse-carriers (*see* **7.5**),

d) Tests for checking constructional requirements of gauge-pieces (*see* **7.6**),

e) Test for non-interchangeability and dimensions (*see* **7.7**),

f) Test for protection against electric shock (*see* **7.8**),

g) Test for moisture resistance (*see* **7.9**),

h) Tests for insulation resistance and electric strength (*see* **7.10**),

j) Test for heating (*see* **7.11**),

k) Test for fusing characteristics (*see* **7.12**),

m) Test for breaking capacity (*see* **7.13**),

n) Test for resistance to heat and fire (*see* **7.14**),

p) Test for mechanical strength of fuse-links (*see* **7.15**),

q) Test for creepage distances, clearances and distances through sealing compound (*see* **7.16**),

r) Test for screws, current carrying parts and connections (*see* **7.17**),

s) Test for resistance to rusting (*see* **7.18**), and

t) Test for checking indelibility and legibility of marking (*see* **7.19**)

7.1.6 *Criteria of Acceptance* — Fuse-bases, fuse-carriers and gauge-pieces are deemed not to comply with this specification if there are more failures than that of one sample in one of the tests. If for fuse-bases, fuse-carriers and gauge-pieces, one sample fails in a test, that test and those preceding which may have influenced the result of that test, are repeated on another set of samples of the number specified in **7.1.4**, all of which shall then comply with the repeated tests.

Fuse-links are deemed not to comply with this specification if there are more failures than that of one sample in one of the tests. If for fuse-links one sample fails in a test, that test and those preceding which may have influenced the result of that test are repeated on another set of samples of twice the number specified in **7.1.4**, all of which shall then comply with the repeated tests.

NOTE — The applicant may submit together with the first set of samples, the additional set which may be needed should one fail. The testing station will then, without further request, test the additional samples and will only reject if a further failure occurs. If the additional set of samples is not submitted at the same time, a failure of one sample will entail rejection.

7.2 Acceptance Tests — The following shall comprise the acceptance tests:

a) Test for checking non-interchangeability by gauges only (*see* **7.7.1**),

b) Test for protection against electric shock (*see* **7.8**),

c) Test for moisture resistance (*see* **7.9**),

d) Tests for insulation resistance and electric strength (*see* **7.10**), and

e) Test for heating (*see* **7.11**).

7.2.1 The sampling plan and place of testing shall be subject to agreement between the manufacturer and the purchaser However, a recommended sampling plan is given in Appendix A.

7.3 Tests for Constructional Requirements of Fuse-Bases

7.3.1 Compliance with **4.2.2** shall be checked by placing the fuse-base on a flat surface, when the fuse-base shall not rock about on axis perpendicular to the axis through the points of support, and by verifying that the part near the fixing holes and in contact with the supporting surface is sufficiently even

7.3.2 Compliance with **4.2.3** shall be checked by inspection during the test specified under **7.4.1**.

7.3.3 Compliance with **4.2.4** shall be checked by tightening the cover fixing screws with a torque equal to two-thirds of that specified in Table 17. After this test the cover shall show no cracks.

7.3.4 Compliance with **4.2.5** shall be checked by the following test.

A fuse-carrier complying with Table 8 and with a fuse-link in position is screwed home into the fuse with a gauge-piece in position, the torque applied being as shown in Table 18.

The fuse-carrier is screwed home and withdrawn 25 times.

After this test, the samples shall show no change, impairing their further use, the fixing screws of the screwed shell and the bottom contact strip shall not have worked loose and the contact strips shall not have moved appreciably.

The fixing of the bottom contact strip is verified by attempting to move it without undue effort.

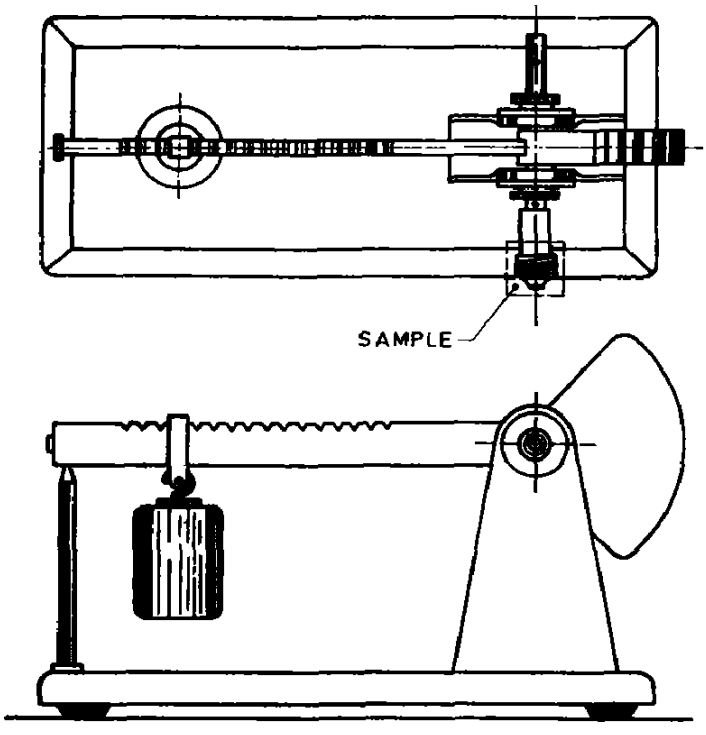


FIG. 2 APPARATUS FOR TORQUE TEST

NOTE 1 — For this test, the apparatus shown in Fig. 2 shall be used.

NOTE 2 — For verifying the lateral displacement of the bottom contact strip, the gauge shown in Table 19 may be used.

7.3.5 Compliance with **4.2.6** shall be checked by manual test.

NOTE — For verifying the lateral displacement of the contact strip, the gauge shown in Table 19 may be used.

7.3.6 Compliance with **4.2.7** shall be checked by inspection and measurement.

7.3.7 Fuse-bases having parts which are cemented or glued together, are immersed for 24 hours in water at a temperature of $27 \pm 5°C$.

After this test the samples shall show no change impairing their further use; in particular the ceramic parts shall remain firmly fixed to each other.

7.4 Tests for Terminals for Fuse-Bases

7.4.1 Compliance with the requirements of **4.2.9.1** to **4.2.9.4** is checked by measurement and, by fitting conductors of the smallest and largest

cross-sectional areas specified in Table 5 or 6. If the length of the extrusion is more than 80 percent of the original thickness of the metal, the mechanical strength of the terminal is checked by the following tests.

Screws and nuts are subjected to the test specified in **7.17** but with the torque increased to 1 2 times the torque specified.

After this test the terminal shall show no damage impairing its further use.

A conductor of the largest cross-sectional area specified in Table 5 or 6 shall be fitted the torque applied being equal to two-thirds of the torque specified in Table 17 and while clamped it is subjected for 1 minute to an axial pull of 50 N applied without jerk.

During this test, the conductor shall not move noticeably in the terminal.

7.4.2 Compliance with **4.2.9.5** shall be checked by the test specified in **7.17**.

7.4.3 Compliance with **4.2.9.6** shall be checked by the following test.

Two nuts are locked together on the stud and through these a torque as shown in Table 20 shall be applied to the stud for 1 minute, five times in each direction. The stud shall not become loose.

7.4.4 Compliance with **4.2.9.7** and **4.2.9.8** shall be checked by inspection of the terminals and of the conductors, after the test specified in **7.4.2**.

7.5 Tests for Constructional Requirements of Fuse-Carriers

7.5.1 Compliance with the requirements of **4.5.1** shall be checked by manual test and by the following test.

The fuse-carrier with a fuse-link in position, is screwed home into a fuse-base with a gauge-piece in position, the torque applied being equal to that specified in Table 18 and then withdrawn.

The test is made five times on the fuse-carrier as delivered.

For fuse-carriers having parts which are cemented or glued together, the test shall be repeated five times after the samples have been immersed for 24 hours in water at a temperature of $27 \pm 5°C$ and again five times after the samples have been conditioned for 1 hour at a temperature of $200 \pm 5°C$.

For fuse-carriers having parts of non-ceramic insulating material, the test is repeated five times after test specified under **7.9** and again five times after the samples have been conditioned for 1 hour at a temperature of $200 \pm 5°C$.

After these tests, the samples shall show no change impairing their further use, in particular, the insulating material shall show no cracks and no undue shrinkage.

NOTE 1 — The test after immersion is made after the test specified under **7.10.3** and the test at 200°C may be combined with that specified under **7.14**.

NOTE 2 — Means for retaining the fuse-link in position other than that shown in Table 8 may be provided.

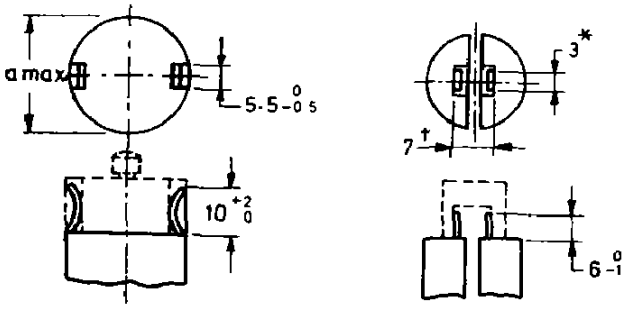
7.5.2 Compliance with **4.3.2** shall be checked by the following tests.

A force of the value shown in the Table 21 is gently applied to the window from both the outside and inside, by means of a steel rod 7 mm in diameter.

During this test, the window shall not break or be displaced.

7.6 Tests for Checking Constructional Requirements of Gauge-Pieces — Compliance with the requirements of **4.4.1** shall be checked by the following tests.

The gauge-piece is screwed home in a fuse-base by applying for 1 minute a torque of 1 Nm It is then withdrawn with the aid of the appropriate hand-key shown in Fig 3.



Type	a
D II	20 5
D III	26 5

FIG. 3 HAND-KEY FOR GAUGE-PIECE

In addition, an axial force of 10 N is applied in both directions between the metal part and the ceramic part of the gauge-piece.

The test is made on the gauge-piece as delivered. For gauge-pieces having parts which are cemented or glued together the test is repeated after the samples have been immersed for 24 hours in water at a temperature of $27 \pm 5°C$ and again after the samples have been conditioned for 1 hour at a temperature of $200 \pm 5°C$

After these tests, the samples shall show no change impairing their further use, in particular the thread shall not be damaged and the ceramic parts shall still be securely fixed to each other and shall not be detached from the metal part.

*Approximate dimensions.
†Resilient between 5 and 9 mm.

NOTE — The test after immersion is made after the test specified under **7.10.3** and the test at 200°C may be combined with that given in **7.14**.

7.7 Test for Checking Non-interchangeability and Dimensions

7.7.1 Compliance with the requirement specified under **5.1** shall be checked by means of the gauges detailed in Tables 19, 22, 23, 24, and 25 and by measurement.

7.7.2 The thickness of the screwed shell shall be measured by means of a micrometer with pointed anvils. The mean value of two sets of three measurements, each set being made on two different generating lines separated by at least 30°, shall not be less than the value specified in the relevant tables.

In general, the three measurements along each generating line shall be made at places evenly distributed along the generating line, if possible, at the most unfavourable spots

For rolled threads, one of the measurements shall be made at the top of the thread, one at the root of the thread and one at random between these measurements.

7.7.3 For fuse-carriers, the measurements shall be made on the part of the screwed shell protruding from the insulating cap

7.7.4 For fuse-bases, the measurements shall not be made within the first turn of the thread

7.7.4.1 For fuse-bases for panel mounting without cover or ring protecting the shell against accidental contact, the diameter C and dimension $40^{+0}_{-2\cdot5}$ shown in Table 2, and diameter C and dimension $50{\cdot}5^{+0}_{-3\cdot5}$ shown in Table 3 need not be verified

7.8 Test for Protection Against Electric Shock — The following test shall be conducted

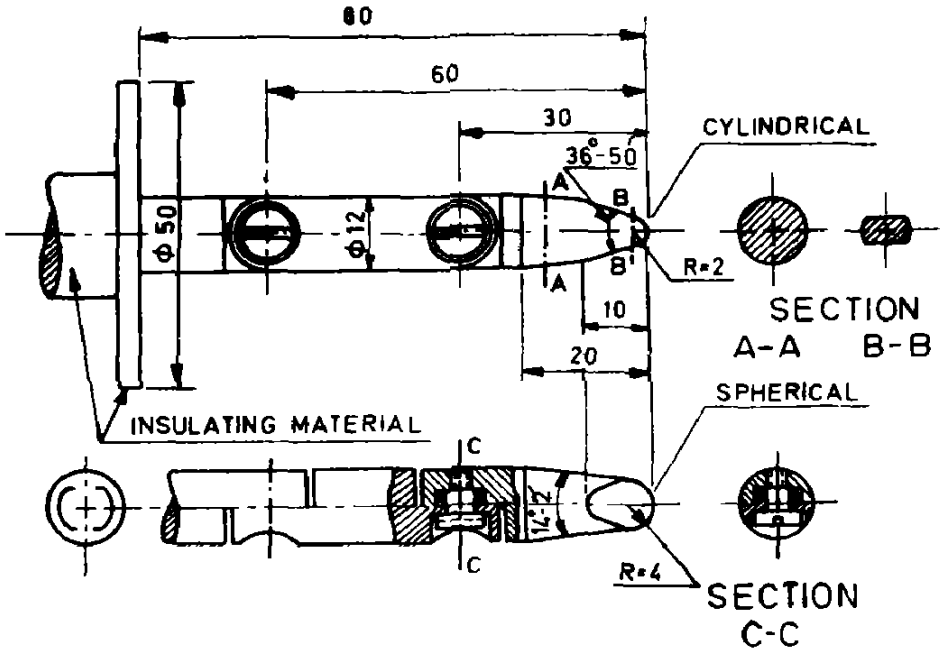
A test finger, as shown in Fig. 4, shall be applied in every possible position, if necessary, with a force of 20 N, an electrical indication with a voltage not less than 40 V being used to show contact with live parts.

7.9 Test for Moisture Resistance

7.9.1 Compliance shall be checked by the humidity treatment described in **7.9.3** followed immediately by the measurement of insulation resistance and by the electric strength test specified in **7.10**.

7.9.2 Cable entries, if any, shall be left open, if knock-outs are provided, one of them shall be opened. Covers and other parts which may be removed without the aid of a tool, shall be removed and subjected, if necessary, to the humidity treatment with the main part.

7.9.3 The humidity treatment shall be carried out in a humidity cabinet



Tolerances. on angles $\pm 5'$; on linear dimensions less than 25 mm $^{0}_{-0.05}$, and on linear dimensions over 25 mm ± 0.2

FIG 4 STANDARD TEST FINGER

containing air with a relative humidity maintained between 91 and 95 percent. The temperature of the air, at all places where samples may be located shall be maintained at a value t which is $35 \pm 5°C$

7.9.4 Before being located in the humidity cabinet the samples shall be brought to a temperature between t and $t+4°C$.

The samples shall be kept in the cabinet for 2 days (48 hours).

NOTE 1 — In most cases the samples may be brought to the specified temperature by keeping them at this temperature for at least 4 hours before the humidity treatment.

NOTE 2 — A relative humidity between 91 and 95 percent may be obtained by placing in the humidity cabinet a saturated solution of sodium sulphate (Na_2SO_4) or potassium nitrate (KNO_3) in water having a sufficiently large contact surface with air.

NOTE 3 — In order to achieve the specified conditions within the cabinet it is necessary to ensure constant circulation of the air within and in general, to use a cabinet which is thermally insulated.

7.9.5 After this treatment, the samples shall show no damage within the meaning of this specification.

7.10 Tests for Insulation Resistance and Electric Strength

7.10.1 These tests shall be conducted immediately after the moisture resistance test (*see* **7.9**). The tests shall be conducted in the humidity cabinet or in the room in which the samples were brought to the prescribed temperature, after reassembly of these parts which may have been removed.

7.10.2 *Insulation Resistance Test* — The insulation resistance shall be measured with a dc voltage of approximately 500 volts applied, the measurement being made 1 minute after application of the voltage.

The insulation resistance is measured consecutively.

a) between current-carrying parts and the exterior, and

b) between the terminals.

When testing fuse-carriers, a distance of 3 mm is left between the metal foil and the lower edge of the insulating cap, the metal foil is not pressed against the inspection window.

The insulation resistance shall not be less than 5 MΩ.

NOTE — The term exterior includes all external metal parts, accessible cover fixing screws, fuse-base fixing screws and metal foil in contact with the outer surface, terminals of fuse-bases for panel mounting are not included.

7.10.3 *Electric Strength Test*

7.10.3.1 The fuse shall be mounted in the same position as will be used in service. For mounting, unpainted metal shall be used. For single pole units, at least three units shall be mounted. If there is more than one mounting position then the position which will stress the fuses to the maximum extent, shall be used.

7.10.3.2 The test voltage shall have a practically sinusoidal waveform and the supply frequency shall be between 40 and 60 Hz. The value of the test voltage shall be selected from Table 26.

7.10.3.3 Initially, not more than half the prescribed voltage shall be applied. It shall then be raised rapidly to the full value. The voltage shall be applied for one minute as follows:

a) With the fuse-link in position, between each of the poles and all other poles connected to each other and unpainted metal plate; and

b) With the fuse-link removed, between the incoming terminals connected together and the outgoing terminals connected together.

7.10.3.4 No flashover or breakdown shall occur during the test.

NOTE — Glow discharges without drop in voltage shall be neglected.

7.11 Test for Heating

7.11.1 The test shall be carried out with the fuse-links placed in the appropriate fuse-carrier which shall be screwed home into a fuse-base, the metal part of a gauge-piece being in position, the fuse-carrier, fuse-base and gauge-piece shall comply with the relevant tables of this specification.

7.11.2 The fuse-base shall be mounted as in normal use on a vertical non-metallic and heat-resistant board, 15 mm thick. The fuse-link shall be loaded with ac or dc at its rated current.

7.11.3 The voltage drop across the fuse-link contacts is measured with dc when the current has been flowing for 1 hour for rated currents up to 63 A, and 2 hours for rated currents up to 100 A.

7.11.4 The value measured shall not exceed the appropriate value specified in Table 27.

NOTE — To facilitate the test procedure for fuse-links having a high rated current, the heating of the fuse-link may be achieved by applying ac, the actual measurement of the voltage drop being made with dc, immediately after the period with ac load.

7.12 Test for Fusing Characteristics

7.12.1 The test shall be carried out with the fuse-link placed in the appropriate fuse-carrier which is screwed home into a fuse-base, the metal parts of the gauge-piece being in position. The fuse-carrier, the fuse-base and the gauge-piece shall comply with the relevant tables of this specification.

7.12.2 The fuse-base shall be mounted as in normal use on a vertical non-metallic and heat-resistant board, 15 mm thick, and shall be fitted with single-core PVC insulated aluminium conductors having a nominal cross-sectional area and a minimum length as given in Table 28.

7.12.3 The tests shall be made with ac unless the fuse-links are for dc only. For fuse-links having a rated current less than 10 A, the test specified under **7.12.6** and **7.12.7** shall be made at a voltage of 240 V $\pm$ 10 percent, for other fuse-links a voltage of 100 V is, in general, sufficient

NOTE — Care shall be taken that during the tests specified under **7.12.6, 7.12.7** and **7.12.8**, the current does not vary appreciably before the fuse-element melts.

7.12.4 The fuse-links shall be subjected to the smaller test current given in Table 29 for the period indicated.

The fuse-links shall not operate

7.12.5 The fuse shall then be allowed to cool to room temperature and subjected to the larger test current given in Table 29

The fuse-links shall operate within the period indicated in Table 29.

7.12.6 A current equal to 7 times the rated current shall be passed and the pre-arcing time shall be determined.

The pre-arcing time of fuse-links having a rated current not exceeding 4 A and that of quick-acting fuse-links having a rated current exceeding 4 A shall not exceed the value shown in Table 30 by more than 0 01 second.

The pre-arcing time of time-lag fuse-links having a rated current exceeding 4 A shall exceed the value given in Table 30.

During this test, the fuse-indicator of at least one of the two of the samples shall operate.

7.12.7 For time-lag fuse-links a current equal to 5 times the rated current shall be passed and the pre-arcing time shall be determined.

The pre-arcing time of fuse-links having a rated current not exceeding 63 A shall not exceed 6 seconds and that of the fuse-links having a rated current exceeding 63 A shall not exceed 10 seconds.

During this test the fuse-indicator of at least one of the two samples shall operate.

7.12.8 For quick-acting fuse-links, a current equal to 1 75 times the rated current shall be passed and the pre-arcing time shall be determined.

The pre-arcing time for any of the fuse-links shall not be less than 10 seconds.

7.12.9 Fuse-links shall be subjected to 100 cycles of operation, each cycle comprising a period of 1 hour during which the current shown in Table 1 shall be passed and a period of 15 minutes without the current flowing.

During these cycles, the fuse-links shall not operate.

7.12.9.1 After these cycles, the fuse shall be allowed to cool down to approximately room temperature, and the fuse-links shall then be loaded with a current equal to 0 9 times the smaller test current shown in Table 29 for the period indicated in that table.

The fuse-links shall not operate.

7.12.9.2 The fuse shall be allowed to cool down to approximately room temperature. Time-lag fuse-links shall, in addition, be loaded with the larger test current shown in Table 29.

The fuse-links shall operate within the period indicated in that table.

NOTE — Care shall be taken that during the test, the current remains stable within ±2 5 percent of the specified value.

7.13 Test for Breaking Capacity

7.13.1 For breaking capacity test, fuse-links shall be mounted according to **7.12**.

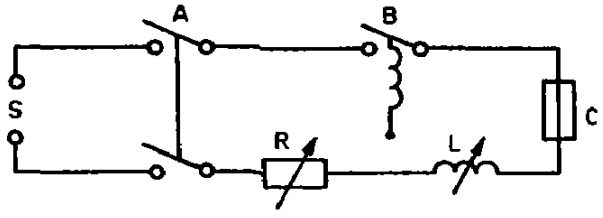
7.13.2 Fuse-links for ac only shall be tested with ac, fuse-links for dc only shall be tested with dc and fuse-links for both ac and dc shall be tested with both ac and dc.

7.13.3 For ac tests, the frequency shall be 50 Hz with a tolerance of ±25 percent, and the circuit shall be closed by a synchronous switch, 30±10° after voltage zero.

7.13.4 The voltage applied shall be 110 percent of rated voltage with a tolerance of 3 percent and the supply circuit shall be such that the recovery voltage is between 110 percent and 115 percent of rated voltage and shall be

maintained for at least 30 seconds after the closing of the circuit, which may be suitably earthed.

7.13.5 The fuse shall be connected in a circuit as shown in Fig. 5 having the characteristics shown in Table 31.



A=Circuit-breaker, single-pole or double-pole;
B=Synchronous switch for ac tests only;
C=Fuse-link under test,
L=Adjustable ironless inductor, if required,
R=Adjustable resistor; and
S=Supply source, ac or dc

FIG. 5 CIRCUIT DIAGRAM FOR BREAKING — CAPACITY TEST

7.13.6 The fuse-links shall be tested under the conditions specified in **7.13.1** to **7.13.5** but with the prospective current shown in Table 32.

7.13.7 Fuse-links shall be tested under the conditions specified under **7.13.1** to **7.13.5** except that:

a) fuse-links for both ac and dc shall be tested with dc only;
b) fuse-links for ac only shall be tested with unity power factor;
c) dc tests shall be made in a substantially non-inductive circuit; and
d) three samples shall be tested at 2·5 times, one at 4 times and one at 8 times the rated current

7.13.8 *Criteria for Passing the Test* — In each of the tests specified in **7.13.5** to **7.13.7,** the fuse-links shall operate satisfactorily and the fuse shall show

a) no permanent arcing;
b) no ignition;
c) no violent bursting of the fuse-link,
d) no welding of the contacts,
e) no damage such as would render unserviceable the fuse-base, the fuse-carrier or the gauge-piece; and
f) no displacement of, or damage to, the inspection window.

7.13.8.1 In addition, the protecting fuse or circuit-breaker incorporated in the test circuit shall not operate.

7.13.8.2 The following phenomena are, however, ignored:

a) Disintegration of the fuse indicator;

b) Cracks in the insulating container of the fuse-link provided it remains in one piece;

c) Blackening of the inspection window; and

d) Small holes, blister spots and localized bulging of the contacts of the fuse-link, provided that the gauge-piece and the fuse-carrier are not damaged

7.14 Test for Resistance to Heat and Fire

7.14.1 Fuse-links, gauge-pieces and fuse-bases containing sealing compound shall be kept for 1 hour in a heating cabinet at a temperature of 150 ± 5°C.

After samples have been allowed to cool down to approximately room temperature, inspection shall show no damage impairing their further rise, no appreciable change in the identification colours of fuse-links and gauge-pieces, and no movement of sealing compound to such an extent that live parts are exposed.

NOTE — A slight displacement of the sealing compound may be neglected Sealing compound may flow, provided the movement does not reduce creepage distances and clearances below the values specified in **5.10**.

7.14.2 Fuse-bases, fuse-carriers, fuse-links and gauge-pieces shall be placed in a heating cabinet which is maintained at a temperature of 200 ± 5°C.

After this test, the samples shall show no damage impairing their further use except that the fuse-element may have melted, the identification colours of fuse-links and gauge-pieces may have changed and the sealing compound may have flown. Insulating parts which are cemented or glued together, shall not have become detached.

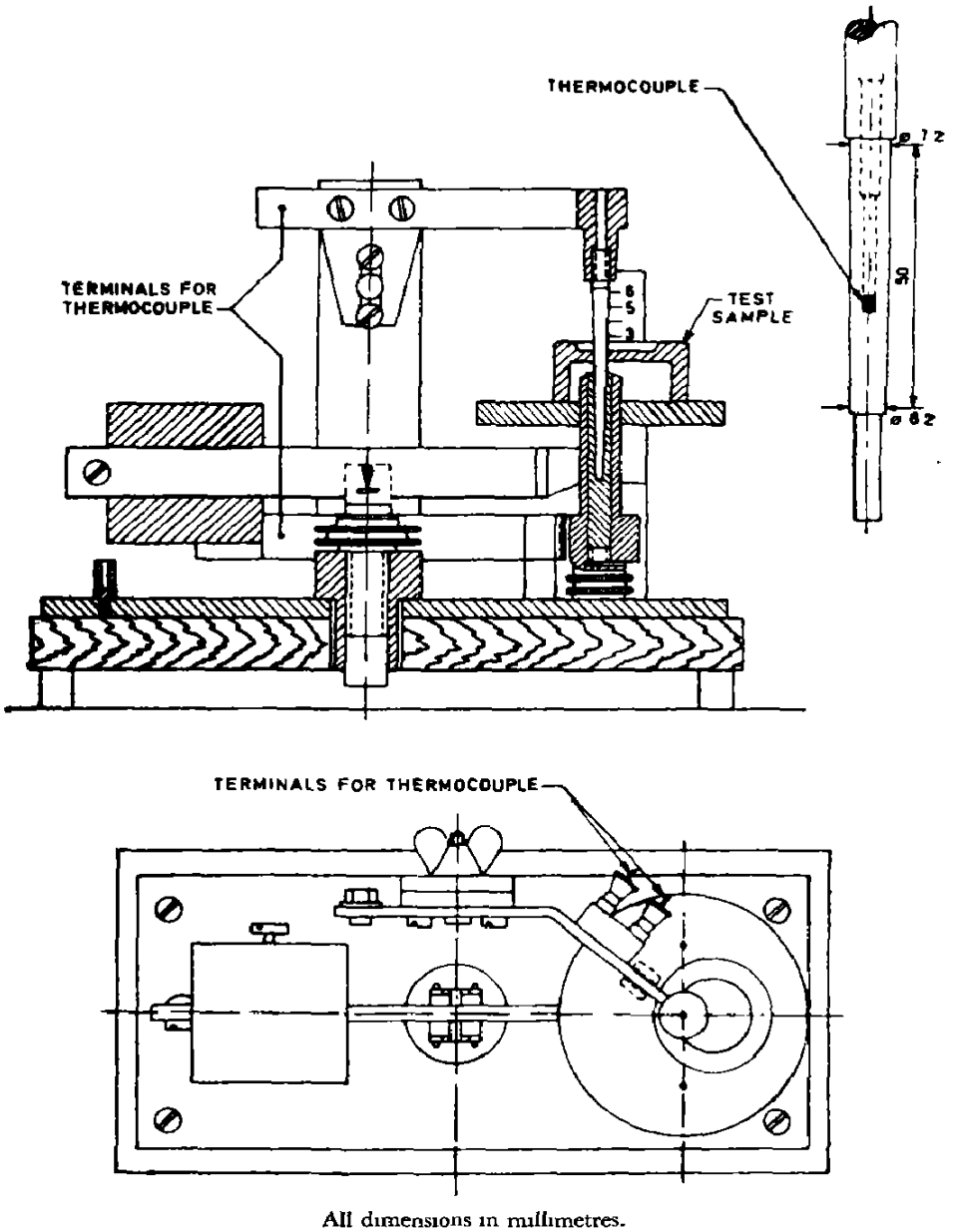
The condition of the samples shall be verified by inspection and, if necessary, by the tests specified in **7.7**, **7.8** and **7.19**.

NOTE — For fuse-carriers and gauge-pieces, this test may be combined with the tests specified in **7.5** and **7.6** respectively.

7.14.3 This test shall be made with an electrically heated conical mandrel in an apparatus as shown in Fig. 6.

The mandrel shall be inserted into a conical hole reamed in the part to be tested in such a way that portions of the conical part of the mandrel of equal length protrude from both sides. The sample shall be pressed against the mandrel with a force of 12 N.

The mandrel shall be heated to a temperature of 300°C in approximately 3 minutes and shall be maintained within 10°C of this value for 2 minutes. The temperature shall be measured by means of a thermocouple inside the mandrel where it is in contact with the sample.



All dimensions in millimetres.

FIG. 6 HOT MANDREL APPARATUS

During the test, sparks of about 6 mm in length shall be produced at the upper surface of the sample where the mandrel protrudes by means of a high frequency spark generator.

Gases produced during the heating shall not be ignited by the sparks.

7.14.3.1 During the test, the samples shall not move on the mandrel by more than 3 mm.

NOTE 1 — The test is not made on parts of ceramic material, but only on fuse-base covers and other external parts of non-ceramic insulating material.

NOTE 2 — Revision of this test is under consideration

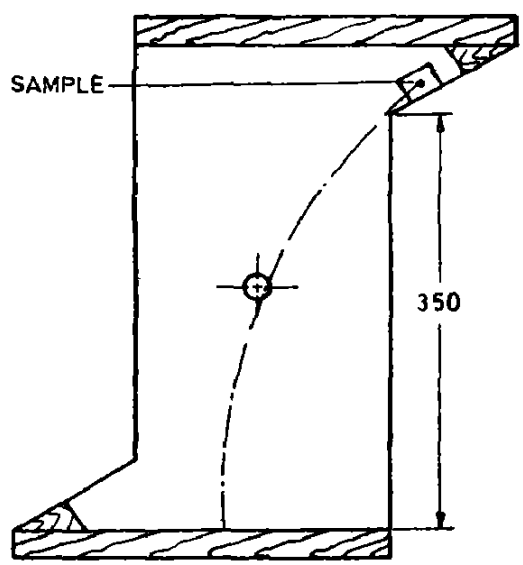
7.15 Test for Mechanical Strength of Fuse-Links

7.15.1 Fuse-links having a rated current not exceeding 63 A shall be tested in a tumbling barrel with hardwood ends, 2 cm thick, as shown in Fig. 7.

Only one sample shall be in the barrel at a time and the barrel shall be turned at a rate of 5 rev/min, the fuse-link thus being subjected to 10 falls per minute.

The samples shall be subjected to 50 falls from a height of 35 cm.

7.15.1.1 After this test, inspection and manual test shall show that the contacts are still securely fixed and that none of the filling has come out.



Dimension in millimetres.

FIG. 7 TUMBLING BARREL

7.15.1.2 *Fuse-links having a rated current not exceeding 10 A shall* then be subjected to a further 450 falls during which the container shall not break.

NOTE — Fuse-links having a rated current exceeding 63 A shall not be subjected to these tests.

7.15.2 The fuse-link shall be placed in the appropriate fuse-carrier which is screwed home into a fuse-base, a gauge-piece being in position. The fuse-carrier, fuse-base and the gauge-piece shall comply with the relevant tables of this specification. The gauge-piece shall have a diameter d_1 equal to the minimum value specified for the relevant rated current.

The torque applied to the fuse-carrier shall be equal to that specified in Table 18.

The fuse-carrier shall be screwed home and withdrawn five times.

7.15.2.1 After this test, the fuse-links shall show no damage within the meaning of this specification, in particular the surfaces of the contacts shall not have become concave.

7.16 Test for Creepage Distances, Clearances and Distances Through Sealing Compound — The measurements to check compliance with **5.10.1** shall be made on fuses fitted first with conductors of the smallest and then with conductors of the largest cross-sectional areas as specified in Table 5 or 6.

NOTE 1 — Conformity to the relevant standard tables ensures that the internal creepage distances and clearances are adequate; they need not otherwise be checked.

NOTE 2 — The contribution to the creepage distance of any groove less than 1 mm vide shall be limited to its width

NOTE 3 — Any air gap less than 1 mm vide shall be ignored in compiling the total clearance.

7.17 Test for Screws, Current Carrying Parts and Connections

7.17.1 Compliance for screws and nuts which are operated during the installation of the fuse shall be checked by the following test.

The screws and nuts shall be tightened and loosened twice by means of a suitable screw driver or spanner, applying a torque as shown in Table 17.

NOTE 1 — Column 1 of Table 17 applies to screws without heads, if the screw when tightened does not protrude from the holes.

NOTE 2 — Column 2 of Table 17 applies to other screws and nuts.

7.17.2 While testing terminal screws and nuts, a rigid (solid or stranded) conductor having the largest cross-sectional areas specified in Table 5 or 6 shall be placed in the terminal.

7.17.3 The conductor shall be moved every time the screw or nut is loosened.

7.17.4 During the test the terminals shall not work loose and no damage

impairing the further use of the screwed connections or terminals shall occur.

NOTE 1 — Screws or nuts which are operated during the installation of the fuse include terminal screws or nuts, screws for fixing covers, etc, but not screws for fixing the fuse-base to the supporting surface.

NOTE 2 — The shape of the blade of the screw driver should suit the head of the screw to be tested The screws and nuts should not be tightened in jerks.

NOTE 3 — Damage to covers shall be neglected.

NOTE 4 — The values given in col 1 of Table 17 are provisional

7.18 Test for Resistance to Rusting

7.18.1 All grease shall be removed from the parts to be tested by dipping in carbon tetrachloride for 10 minutes. The parts shall then be immersed for 10 minutes in a 10-percent solution of ammonium chloride in water at a temperature of $27 \pm 5°C$.

7.18.2 Without drying, but after shaking off any drops, the parts shall be placed for 10 minutes in a box containing air saturated with moisture at a temperature of $27 \pm 5°C$.

7.18.3 After the parts have been dried for 10 minutes in a heating cabinet at a temperature of $100 \pm 5°C$, their surfaces shall show no signs of rust.

NOTE — Traces of rust on sharp edges and any yellowish film removable by rubbing shall be ignored.

7.19 Test for Checking Indelibility and Legibility of Marking—Compliance with **6.6** shall be checked by inspection and by rubbing the marking with a piece of cloth soaked with water and again with a piece of cloth soaked with petroleum spirit.

NOTE — Revision of this test is under consideration.

TABLE 1 TEST CURRENTS

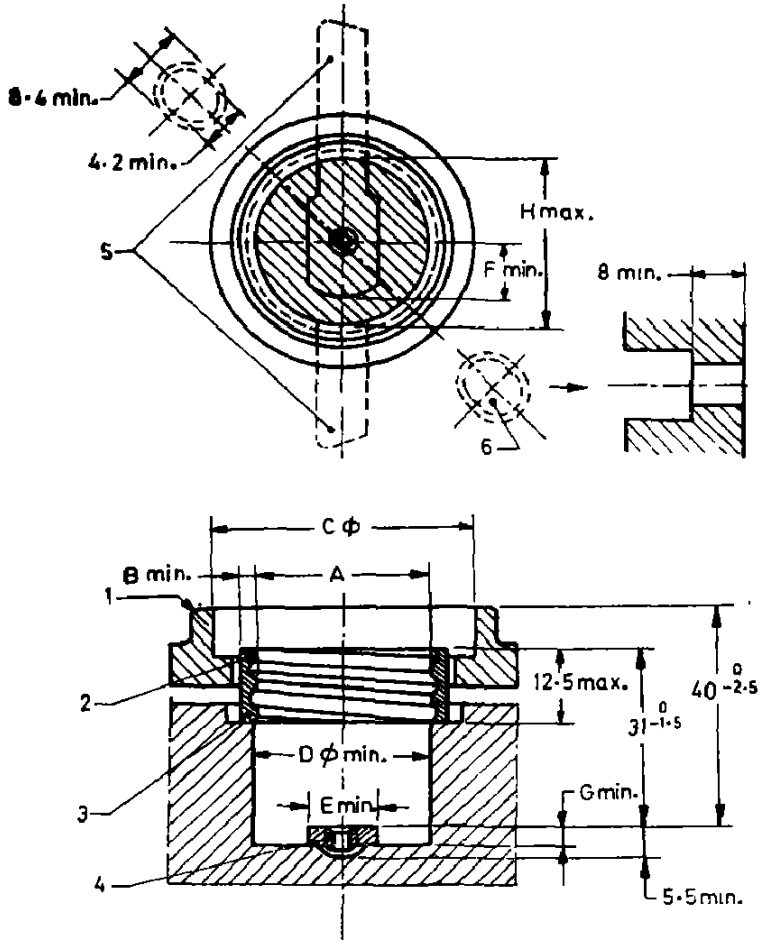
(*Clauses* 0 3 *and* 7.12.9)

RATED CURRENT OF FUSE-LINK, I_n	TEST CURRENT
(1)	(2)
A	A
Up to and including 10	1 2 I_n
Over 10 up to and including 25	1 12 I_n
,, 25 ,, ,, ,, ,, 100	1 08 I_n

TABLE 2 FUSE-BASE FOR FRONT CONNECTION — TYPE D II, 25 A 500 V; AND TYPE D III, 63 A 500 V

(*Clauses* 4.2 5, 4.2.7, 5 1.2 *and* 7.7.4.1)

All dimensions in millimetres.



(*Continued*)

TABLE 2 FUSE-BASE FOR FRONT CONNECTION — TYPE D II, 25 A 500 V; AND TYPE D III, 63 A 500 V—*Contd*

TYPE	DIMENSIONS								Q mm²
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H**	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
D II	E 27	0 5†	35^{+2}_{-0}	25 5	10	5	2 0	24·5	15
D III	E 33	0 65†	$45^{+2\cdot5}_{-0}$	31 5	12	6	2 5	30 5	30

1=This edge of the cover shall be slightly rounded

2=The effective thread length of the screwed shell shall be at least 7 mm from the top.

3=The lower part of the screwed shell and the upper part of its support shall be so designed that the 'GO' gauges C 13 can be fully inserted.

4=The 3/16 in Whitworth thread in the hole for fixing the gauge-piece shall be concentric with the screwed shell and shall have an effective thread length of at least.

2 2 mm for Type D II, and
3 2 mm for Type D III

5=The cross-sectional area of the contact strips shall be at least Q mm².

6=Slotted holes, closed or open, may be used for fixing the fuse-base to its support.

If slotted holes are used, they shall have the dimensions shown.

NOTE — The sketches are not intended to govern design except as regards the dimensions shown.

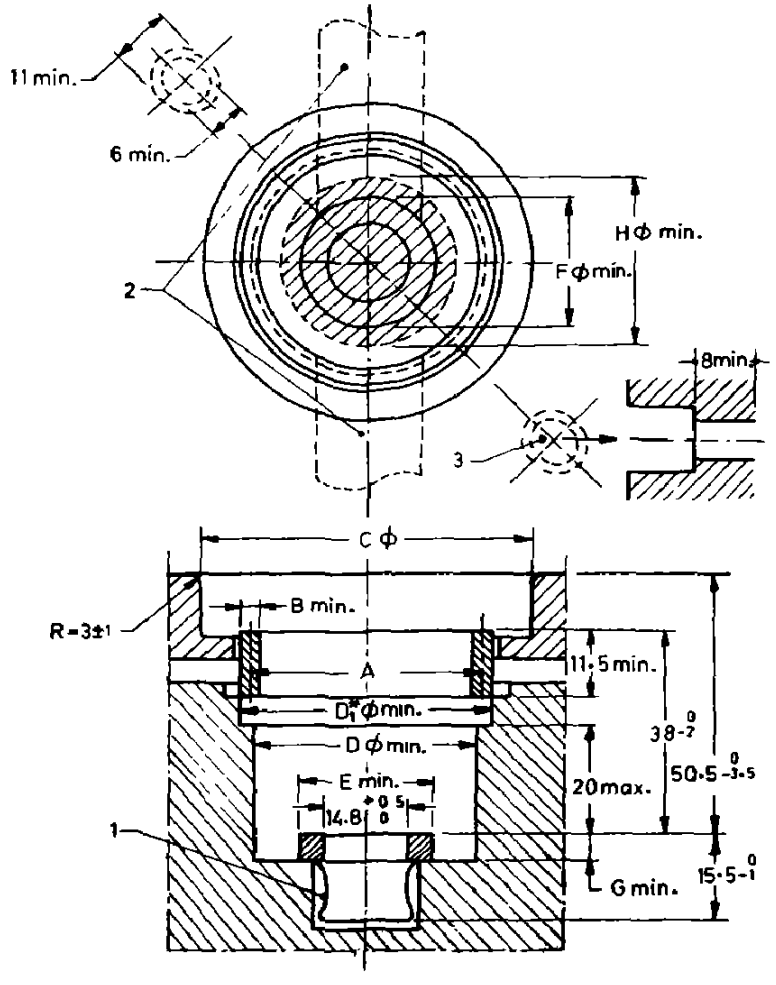
******See* **4.2.7.**

†Within the first turn of the thread (that is, 3 6 mm for Type D II and 4 2 mm for Type D III from the top), a tolerance of −0 1 and −0 15 mm respectively is allowed.

TABLE 3 FUSE-BASE FOR FRONT CONNECTION — TYPE D IV H, 100 A 500 V

(Clauses 4 2.5, 4 2.7, 5.1 2 and 7.7 4 1)

All dimensions in millimetres



(Continued)

TABLE 3 FUSE-BASE FOR FRONT CONNECTION — TYPE D IV H, 100 A 500 V—*Contd*

TYPE	DIMENSIONS									Q mm²
	A	*B*	*C*	*D*	D_1*	*E*	*F*	*G*	*H*†	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
D IV H	R 1¼ in	2 5*	57^{+3}_{-0}	40	44	24	24	25	32	60

1=Resilient grip for gauge-piece

2=The cross-sectional area of the contact strips shall be at least Q mm²

3=Slotted holes, closed or open, may be used for fixing the fuse-base to its support.

If slotted holes are used, they shall have the dimensions shown.

NOTE — The sketches are not intended to govern design except as regards the dimensions shown.

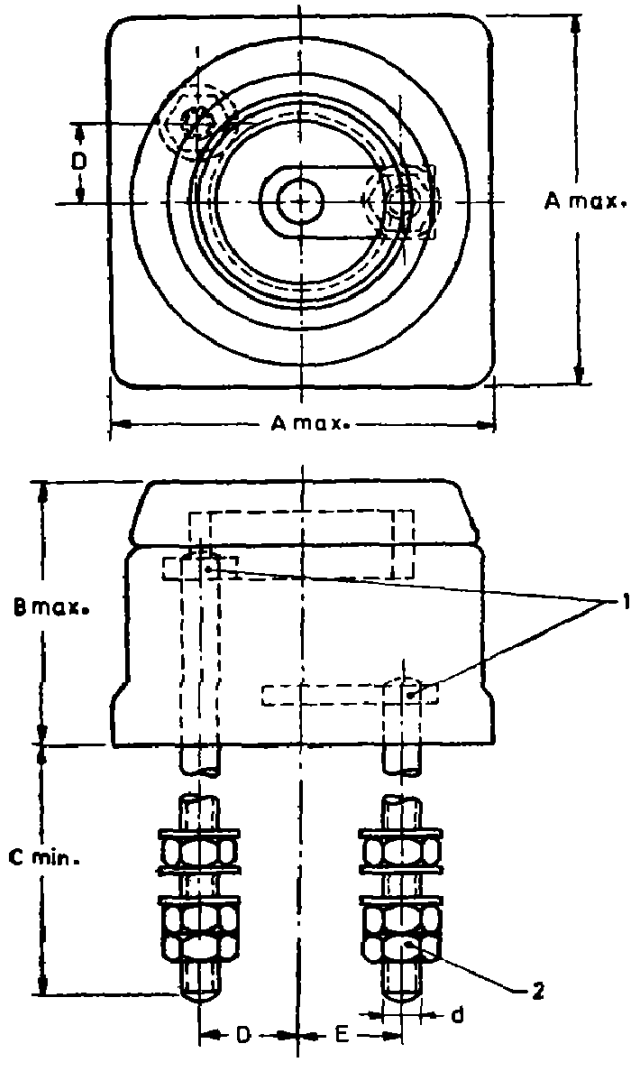
*Within the first turn of the thread (that is, 2 3 mm from the top), a tolerance of −0 5 mm is allowed.

†*See* 4.2.7.

TABLE 4 FUSE-BASE FOR BACK CONNECTION — TYPE D II, 25 A 500 V; TYPE D III, 63 A 500 V; AND TYPE D IV H, 100 A 500 V

(*Clauses* 4.2.5, 4.2.6 *and* 5.1.2)

All dimensions in millimetres



(*Continued*)

TABLE 4 FUSE-BASE FOR BACK CONNECTION — TYPE D II, 25 A 500 V; TYPE D III, 63 A 500 V; AND TYPE D IV H, 100 A 500 V—*Contd*

TYPE	DIMENSIONS					
	A	*B*	*C*	*D*	*E*	*d*
(1)	(2)	(3)	(4)	(5)	(6)	(7)
D II	55	58	30	13±0 5	14±0 5	M 5
D III	65	58	35	16±0 5	18±0 5	M 6
D IV H	86	78	45	21±1	22±1	M 8

1=Terminal studs securely fixed to the contact strips.

2=Connection secured by means of lock nuts or spring washers.

For the other dimensions, *see* Tables 2 and 3

NOTE — The sketches are not intended to govern design except as regards the dimensions shown.

TABLE 5 SIZES OF CONDUCTORS

(*Clauses* 4 2 9.2, 7 4.1, 7.16 *and* 7 17 2)

RATED CURRENT OF FUSE-BASE	NOMINAL CROSS-SECTIONAL AREA
(1)	(2)
A	mm^2
25	1 5 to 10
63	2 5 ,, 25
100	10 ,, 50

TABLE 6 SIZES OF CONDUCTORS (PANEL MOUNTING)

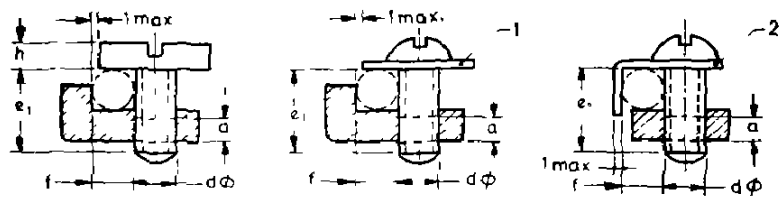
(*Clauses* 4 2.9.3, 7 4 1, 7 16 *and* 7 17 2)

RATED CURRENT OF FUSE-BASE	NOMINAL CROSS-SECTIONAL AREA
(1)	(2)
A	mm^2
25	1 5 to 6
63	4 ,, 16
100	10 ,, 35

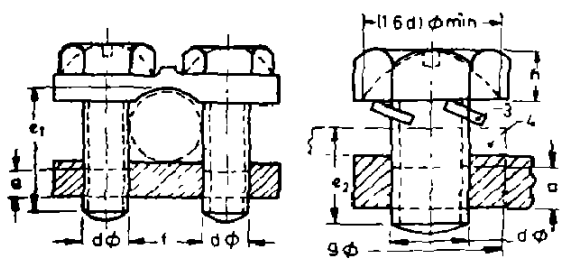
TABLE 7 TERMINALS FOR FUSE-BASES

(*Clause* 4 2.9.4)

All dimensions in millimetres



For Fuse-Bases of Type D II Only



1 = Washer

2 = Clamp

3 = Spring washer

4 = Cable lug or bar

For Stranded Conductors For Cable Lugs and Bars

(*Continued*)

TABLE 7 TERMINALS FOR FUSE-BASES — *Contd*

Type	Single-Screw Terminal		Double-Screw Terminal*		e_1	e_2	f		g†	h
	a‡	d	a‡	d			Cl 4.2.9.2	Cl 4.2.9.3		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
D II	25	M 5	20	M 4	7	6	43	36	15§	30
D III	35	M 6	25	M 5	10	8	70	55	19§	35
D IV H	45	M 8	35	M 6	14	10	110	95	23	50

NOTE — The sketches are not intended to govern design except as regards the dimensions shown.

*If more than two screws are used, they shall be so designed that the sum of their cross-sectional areas at the root of the thread is at least equal to the cross-sectional area of the smallest screw for a single-screw terminal, as shown in the table

†A clamping area with a smooth contact surface shall be provided around the screw within the circle with diameter g, for clamping the lugs or bars

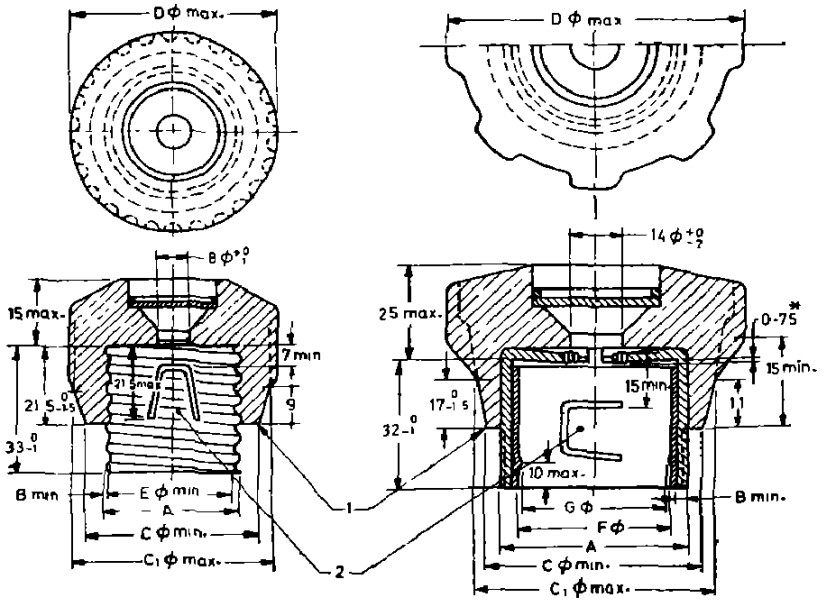
‡Effective thread length (*see also* **4.2.9.4**).

§These values are only valid for the bottom contact-strip; for the other contact-strip, the values are 13 and 16 mm respectively.

TABLE 8 FUSE-CARRIER — TYPE D II, 25 A 500 V; TYPE D III, 63 A 500 V; AND TYPE D IV H, 100 A 500 V

(*Clauses* 5 1 2, 7 3 4 *and* 7 5 1)

All dimensions in millimetres



Types D II and D III — Type D IV H

1=This edge of the insulating cap shall be slightly rounded

2=Resilient part of the means for retaining the fuse-link in position.

*Resilient between 0·5 and 1 mm

(*Continued*)

TABLE 8 FUSE-CARRIER — TYPE D II, 25 A 500 V; TYPE D III, 63 A 500 V; AND TYPE D IV H, 100 A 500 V — *Contd*

TYPE	DIMENSIONS							
	A	*B*	*C*	C_1	*D*	*E*	*F*	*G*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
D II	E 27	0 32*	32	34	38†	22 5	—	—
D III	E 33	0 37	40	43	48†	28 0	—	—
D IV H	R $1\frac{1}{4}$ in	$2{\cdot}5^{\ddagger}_{\ddagger}$	52	55	70	—	35^{+1}_{-0}	—

NOTE — The sketches are not intended to govern design except as regards the dimensions shown.

*Provisionally, a thickness of 0 27 mm is allowed, when measured as specified in **5.1.2**.

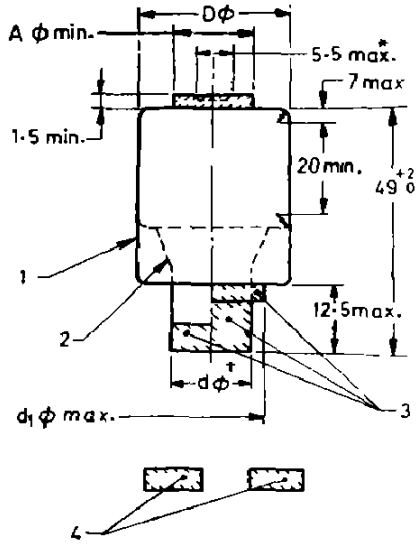
†For fuse-carriers designed to be sealed, a tolerance of +1 mm is allowed.

‡Within the first turn of the thread (that is, 2 3 mm from the edge of the shell), a tolerance of −0 5 mm is allowed.

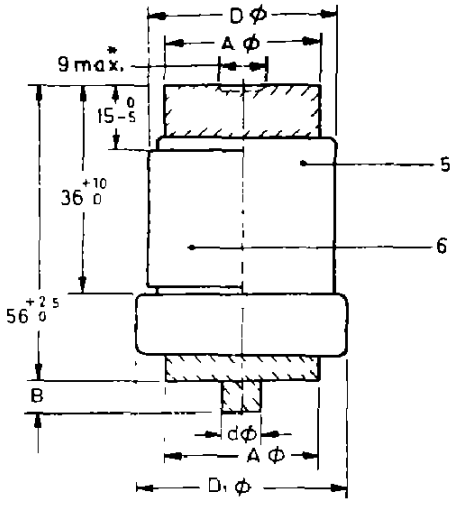
TABLE 9 FUSE-LINK — TYPE D II, 0·5 TO 25 A 500 V; TYPE D III, 35 TO 63 A 500 V; AND TYPE D IV H, 80 TO 100 A 500 V

(*Clause* 5 1.2)

All dimensions in millimetres.



Types D II and D III



Type D IV H

(*Continued*)

TABLE 9 FUSE-LINK — TYPE D II, 0 5 TO 25 A 500 V; TYPE D III, 35 TO 63 A 500 V; AND TYPE D IV H, 80 TO 100 A 500 V — *Contd*

Type	Rated Current A	Dimensions					
		A	*B*	*D*	D_1	*d*	d_1
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
D II	0 5, 1, 2, 4, 6, 10, 16, 20, 25	11 (0 5 to 6 A); 13 (10 to 25 A)	—	$22\ 5^{+0}_{-1\ 5}$	—	6, 6, 6, 6, 6, 8, 10, 12, 14 $^{-0\ 2}_{-0\ 4}$	14 2
D III	35, 50, 63	15	—	$28\ 0^{+0}_{-2}$	—	16, 18, 20 $\pm 0\ 2$ $-0\ 4$	20 2
D IV H	80, 100	32^{+0}_{-8}	$6 \pm 0\ 3$	34^{+0}_{-2}	$38\ 5^{+0}_{-2}$	5, 7 $\pm 0\ 2$	—

1 = Normal shape of insulating container.
2 = Alternative shape.
3 = Alternative designs of contacts
4 = Metal contact pieces
5 = Fuse-link without metal cover.
6 = Optional metal cover.

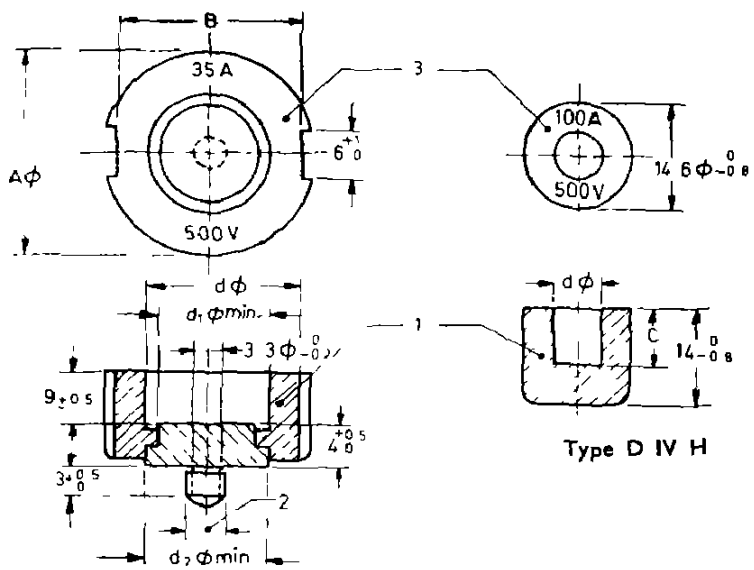
NOTE — The sketches are not intended to govern design except as regards the dimensions shown.

*Diameter of fuse-indicator
†The maximum value indicated in the table shall not be exceeded within a distance of 10 mm from the end of the contact.

TABLE 10 GAUGE-PIECE — TYPE D II, 0·5 TO 25 A 500 V; TYPE D III, 35 TO 63 A 500 V; AND TYPE D IV H, 80 TO 100 A 500 V

(*Clause* 5 1 2)

All dimensions in millimetres.



Types D II and D III

(*Continued*)

TABLE 10 GAUGE-PIECE — TYPE D II, 0·5 TO 25 A 500 V; TYPE D III, 35 TO 63 A 500 V; AND TYPE D IV H, 80 TO 100 A 500 V — *Contd*

TYPE	RATED CURRENT A	DIMENSIONS						COLOUR OF THE FRONT SURFACE
		A	*B*	*C*	*d*	d_1	d_2	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
D II	0·5	$24^{-0}_{-1\cdot5}$	$20^{+0}_{-1\cdot5}$	—	$6\cdot5^{+0\cdot8}_{-0}$	4·5	6·5	Light blue
	1				6·5	4·5	6·5	Red
	2				6·5	4·5	6·5	Pink
	4				6·5	4·5	6·5	Brown
	6				6·5	4·5	6·5	Green
	10				8·5	6·5	6·5	Red
	16				10·5	8·5	8·5	Grey
	20				12·5	9·5	9·5	Blue
	25				14·5	9·5	9·5	Yellow
D III	35	$30^{-0}_{-1\cdot5}$	$26^{+0}_{-1\cdot5}$	—	$16\cdot5^{+0\cdot8}_{-0}$	15·0	15·0	Black
	50				18·5	15·0	15·0	White
	63				20·5	15·0	15·0	Copper
D IV H	80	—	—	$6^{+0\cdot6}_{-0}$	$6^{+0\cdot5}$	—	—	Silver
	100				8			Red

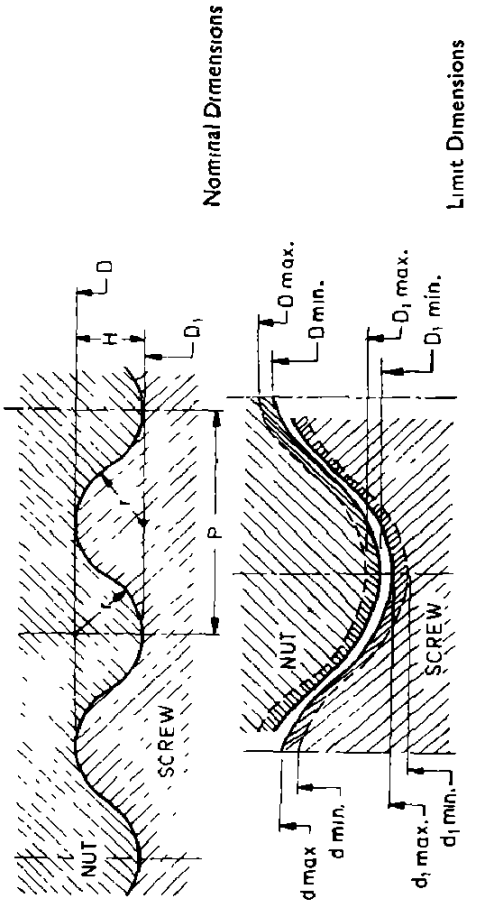
1 = Calibration ring of ceramic material
2 = The 3/16 in Whitworth thread shall have an effective length of at least 2·5 mm.
3 = Coloured surface.

NOTE — The sketches are not intended to govern design except as regards the dimensions shown

TABLE 11 EDISON THREAD — E 27 AND E 33

(*Clause* 5.1.2)

All dimensions in millimetres.

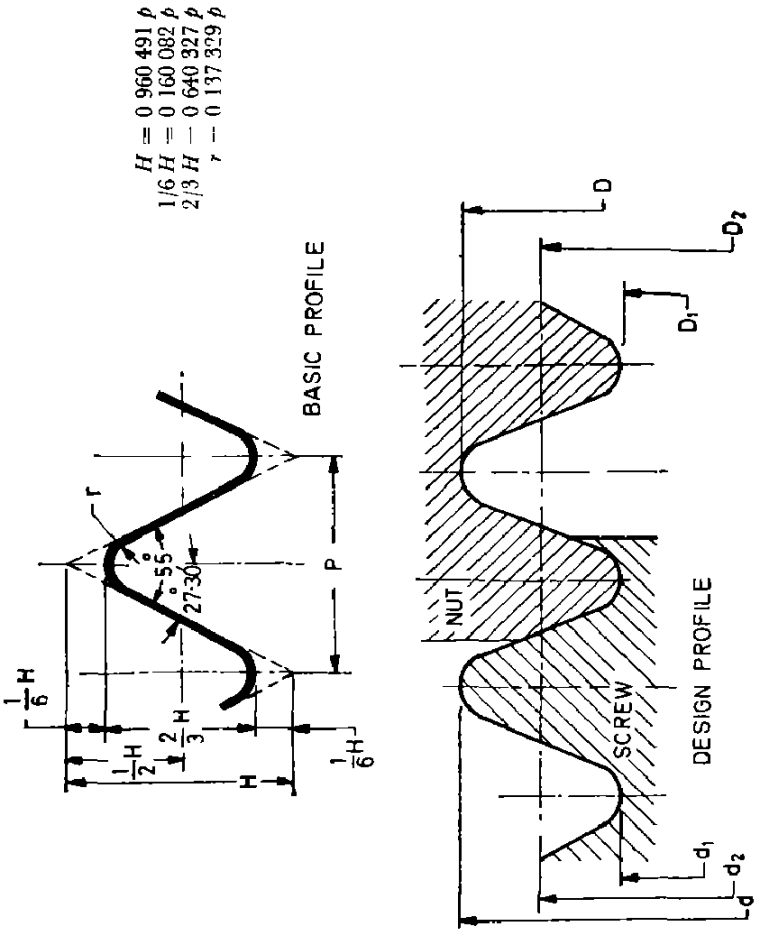


Designation	Screw				Nut				Other Dimensions				
	d		d_1		D		D_1		D	D_1	p	H	r
	Max	Min	Max	Min	Max	Min	Max	Min					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
E 27	26 45	26 15	24 26	23 96	26 85	26 55	24 66	24 36	26 50	24 31	3 629	1 095	1 025
E 33	33 05	32 65	30 45	30 05	33 55	33 15	30 05	30 55	33 10	30 50	4·233	1 300	1 187

TABLE 12 3/16 in WHITWORTH THREAD

(*Clause* 5 1 2)

All dimensions in millimetres



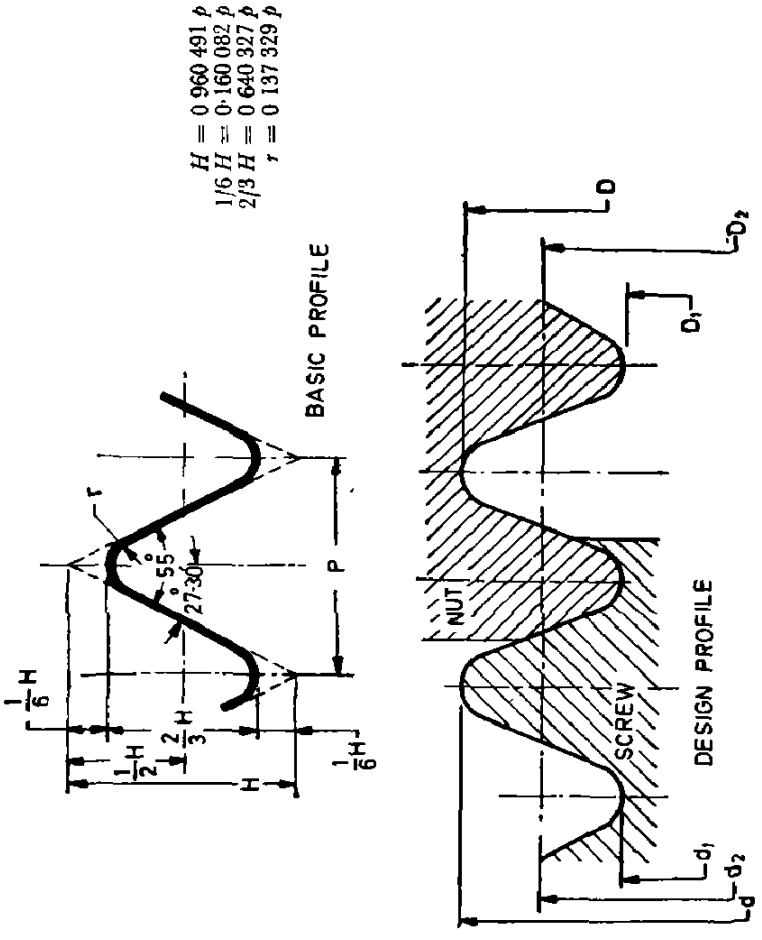
Designation	Pitch	Screw						Nut				
	p	d		d_2		d_1		D	D_2		D_1	
		Max	*Min*	*Max*	*Min*	*Max*	*Min*	*Min*	*Max*	*Min*	*Max*	*Min*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
W 3/16 in	1 058*	4 732	4 593	4 054	3 965	3 376	3 183	4 762	4 216	4 084	3 744	3 406

*Equivalent to 24 threads per inch.

TABLE 13 FASTENING THREAD R $1\frac{1}{4}$ in

(*Clause* 5.1.2)

All dimensions in millimetres.



Designation	Pitch	Screw						Nut				
	p	d		d_2		d_1		D	D_2		D_1	
		Max	*Min*	*Max*	*Min*	*Max*	*Min*	*Min*	*Max*	*Min*	*Max*	*Min*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
R $1\frac{1}{2}$ in	2 309*	41 910	41 550	40 431	40 251	38 952	38 727	41·910	40·611	40·431	39·592	38·952

*Equivalent to 11 threads per inch.

TABLE 14 CREEPAGE DISTANCES AND CLEARANCES

(*Clause* 5 10 1)

	DISTANCE mm
Creepage	
Between metal parts, including contacts, which are of different polarity when the fuse-link has operated	5
Between live parts and accessible metal parts, including fuse-base fixing screws, with a fuse-carrier, a fuse-link and a gauge-piece in position	5
Between live parts and cover fixing screws which are not earthed and not accessible to the standard test finger	3
Clearance	
Between metal parts, including contacts, which are of different polarity when the fuse-link has operated	5
Between live parts and accessible metal parts, including fuse-base fixing screws, with a fuse-carrier, a fuse-link and a gauge-piece in position	5
Between live parts and the cover fixing screws which are not earthed and not accessible to the standard test finger	3
Between live parts and the surface on which a fuse-base for front connection is mounted	10
Distance through sealing compound between live parts covered with at least 2 5 mm of sealing compound and the surface on which a fuse-base for front connection is mounted	5

TABLE 15 COLOUR OF GAUGE-PIECE/FUSE INDICATOR

(*Clauses* 6 3 2 *and* 6 4 1)

RATED CURRENT	COLOUR OF GAUGE-PIECE/FUSE INDICATOR
(1)	(2)
A	
0 5	Under consideration*
1	Under consideration*
2	Pink*
4	Brown*
6	Green*
10	Red
16	Grey
20	Blue
25	Yellow
35	Black
63	Copper
80	Silver
100	Red

*Refer to Note under **6.3.2** (for gauge-pieces).

TABLE 16 SAMPLING FOR TYPE TESTS

(*Clause* 7 1 4)

Tests of Clauses	Number of Samples		
	AC only	DC only	Both ac and dc
(1)	(2)	(3)	(4)
7.9, 7.10 and 7 14	3	3	3
7 11, 7.12 4 and 7 12 5	3	3	3
7.12.6	3	3	3
7 12.7 and 7 12 8	3	3	3
7 12 9	6	6	6
7.13 5	3	3	6
7 13 6	3	3*	3
7 13.7	5	5	5
7 15.1	3	3	3
7 15 2	3	3	3

*For fuse-links rated up to 10 A only.

TABLE 17 TORQUE VALUES FOR SCREWS AND NUTS

(*Clauses* 7 3 3, 7 4 1, 7 17 1 *and* 7 17 4)

Nominal Diameter of Thread	Torque	
	I	II
(1)	(2)	(3)
mm	Nm	Nm
2 6	0 2	0 4
3 0	0 25	0 5
3 5	0 4	0 8
4 0	0 7	1 2
5 0	0 8	2 0
6 0	—	2 5
8 0	—	5 5
10 0	—	7 5

TABLE 18 TORQUE VALUES (FUSE-CARRIER)

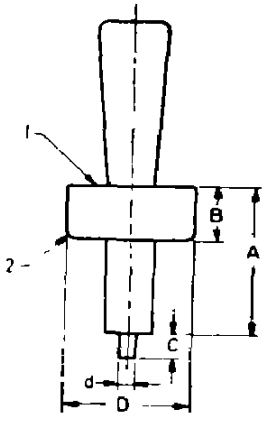
(*Clauses* 7 3 4, 7 5 1 *and* 7.15 2)

Thread	Torque
(1)	(2)
	Nm
E 27	4 0
E 33	6 5
R $1\frac{1}{4}$ in	10 0

TABLE 19 GAUGES C 17 FOR VERIFYING THE POSITION OF THE HOLE FOR FIXING THE GAUGE-PIECE

(Clauses 7.3.4, 7.3.5 and 7.7.1)

All dimensions in millimetres.



TYPE	DIMENSIONS										GAUGE
	A		*B*		*C*		*D*		*d*		
	Max	*Min*	*Max*	*Min*	*Max*	*Min*	*Max*	*Min*	*Max*	*Min*	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
D II	31	30·5	11·5	11·0	5	4·5	24·3	24·2	3·0	2·9	C 17 A
D III	31	30·5	11·5	11·0	5	4·5	30·5	30·4	3·0	2·9	C 17 B
D IV H	38	37·5	17·0	16·5	14	13·5	38·9	38·8	14·4	14·3	C 17 C

1 = Surface *E*.
2 = Slightly rounded edge.

The gauges are intended for verifying that the hole for fixing the gauge-piece in the bottom contact-strip is concentric with the screwed shell.

It shall be possible to introduce the gauge without undue force into the fuse-base so that the surface *E* is approximately level with the upper edge of the screwed shell.

Material: Steel.

TABLE 20 TORQUE VALUES (TERMINAL STUDS)

(*Clause* 7.4.3)

THREAD	TORQUE
(1)	(2)
	Nm
M 5	2·5
M 6	5·0
M 8	7·5
M 10	10·0

TABLE 21 FORCE VALUES

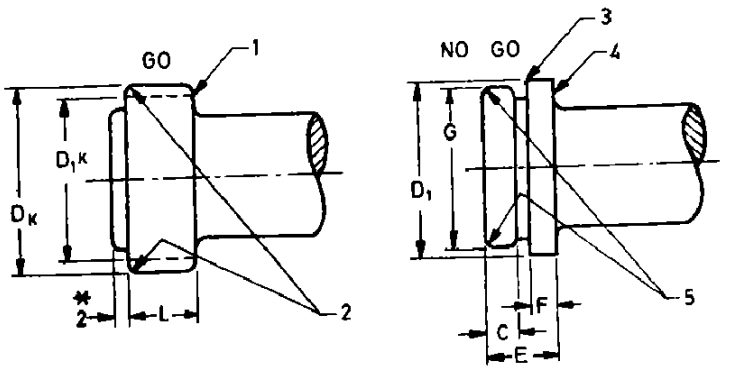
(*Clause* 7.5.2)

THREAD	FORCE
(1)	(2)
	N
E 27 and E 23	5
R 1¼ in	10

TABLE 22 GAUGES C 13 FOR SCREWED SHELLS OF FUSE-BASES

(*Clause* 7 7.1)

All dimensions in millimetres



1 = Surface *E*.
2 = Slightly rounded edge.
3 = Sharp edge.
4 = Surface *T*.
5 = Slightly chamfered edge.

It shall be possible to screw the 'GO' gauge home at least to the surface E with the maximum torque *M*.
The 'NO GO' gauge shall not engage under its own weight further than to the surface *T*
Material: Steel, parts exposed to wear shall be hardened

*Approximate dimension.

GO

Designation	Outer Diameter of the Thread D_k			Diameter at the Root of the Thread D_{1k}			L +0·1 −0	M	Gauge
	Max	Min		Max	Min				
		Manuf	Wear		Manuf	Wear			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9) Nm	(10)
E 27	26 580	26 550	26 520	24 390	24 360	24 330	11·5	1·0	C 13 A
E 33	33 180	33 150	33 110	30 580	30 550	30 510	11·5	1·5	C 13 B
R 1¼ in	41 948	41 932	41 910	38 996	38 974	38 952	17·0	2·0	C 13 C

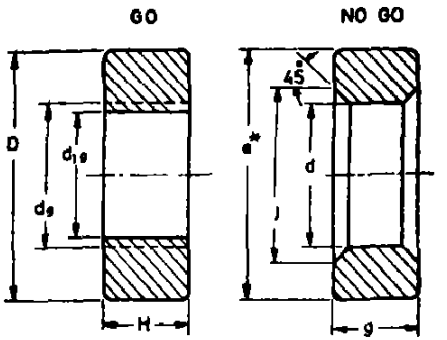
NO GO

Designation	Diameter of Measuring Plug D_1		Diameter of Guiding Plug G		Eccentricity D_1-G Tolerance	Dimensions						Mass		Gauge
						F		C		E		z		
	Max	Min	Max	Min		Max	Min	Max	Min	Max	Min	Max g	Min g	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
E 27	24 665	24 655	24 31	24 26	0·030	4·0	3·9	4·5	4·3	10·0	9·8	357	293	C 13 E
E 33	30 955	30 945	30 50	30 45	0·030	5·0	4·9	6·0	5·8	13·0	12·8	522	428	C 13 F
R 1¼ in	39 598	39 586	38 90	38 85	0·035	7·0	6·9	8·0	7·8	17·0	16·8	880	720	C 13 G

TABLE 23 GAUGES C 14 FOR SCREWED SHELLS OF FUSE-CARRIERS

(*Clause* 7.7.1)

All dimensions in millimetres.



It shall be possible to screw the 'GO' gauge on the whole length of the thread with the maximum torque *M*.
The 'NO GO' gauge shall not slip on the thread under its own weight.
Material: Steel, parts exposed to wear shall be hardened.

GO

Designation	Outer Diameter of the Thread d_g			Diameter at the Root of the Thread d_{1g}			H		D ±0 5	M	Gauge
	Min	*Max*		*Min*	*Max*		*Min*	*Max*			
		Manuf	Wear		Manuf	Wear					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11) Nm	(12)
E 27	26 420	26 450	26 480	24 230	24 260	24 290	21 95	22·00	48	1·0	C 14 A
E 33	33 020	33 050	33 090	30 420	30 450	30 490	29 95	30 00	56	1 5	C 14 B
R 1¼ in	41·866	41 888	41 910	38·914	38 930	38 952	24·95	25 00	75	2·0	C 14 C

NO GO

Designation	d		e*	g		t		Mass		Gauge
	Min	*Max*		*Min*	*Max*	*Min*	*Max*	*Min* g	*Max* g	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
E 27	26 145	26 155	47	15·95	16·00	28 8	29·0	135	165	C 14 E
E 33	32 645	32 655	58	19 95	20 00	35 8	36 0	252	308	C 14 F
R 1¼ in	41 568	41 578	75	19 95	20 00	44 8	45·0	432	528	C 14 G

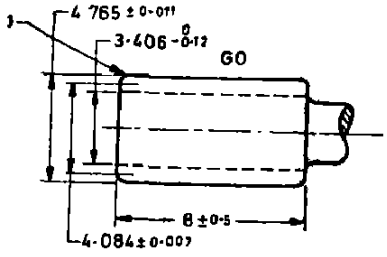
*Approximate dimension.

TABLE 24 GAUGES C 15 FOR 3/16 in WHITWORTH THREAD

(*Clause* 7 7.1)

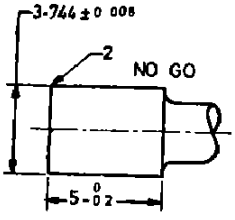
All dimensions in millimetres

GO



C 15A

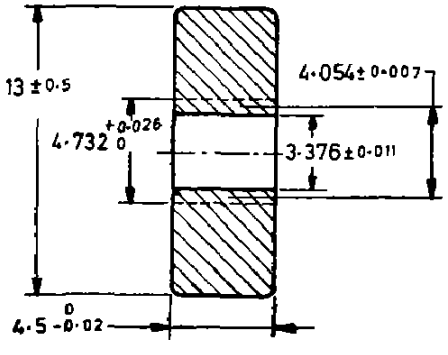
NO GO



Mass. 70±7g

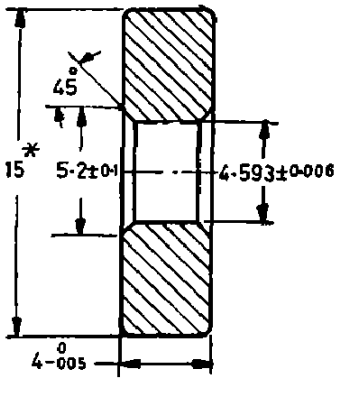
C 15B

GO



C 15C

NO GO



Mass: 15g

C 15D

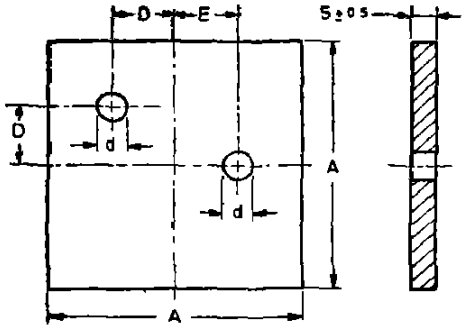
1 = Slightly rounded edge.
2 = Sharp edge.

It shall be possible to screw the 'GO' gauges home with a maximum torque of 0 2 Nm.
The 'NO GO' gauges shall not engage or slip on under their own weight.
Material: Steel, parts exposed to wear shall be hardened.

*Approximate dimension.

TABLE 25 GAUGES C 16 FOR FUSE-BASES FOR BACK CONNECTION
(Clause 7.7.1)

All dimensions in millimetres.



Type	Dimensions				Gauge
	A	*D*	*E*	*d*	
(1)	(2)	(3)	(4)	(5)	(6)
D II	56±0.1	13±0.01	14±0.01	6±0.01	C 16 A
D III	66±0.1	16±0.01	18±0.01	7±0.01	C 16 B
D IV H	87±0.1	21±0.01	22±0.01	10±0.01	C 16 C

The gauge shall slide down to the fuse-base under its own weight, the underside of the fuse-base being parallel to the gauge.

Material : Steel, parts exposed to wear shall be hardened

TABLE 26 DIELECTRIC TEST VOLTAGES

(*Clause* 7.10 3.2)

Rated Voltage of Fuse	Dielectric Test Voltage AC (rms)
(1)	(2)
V	V
Up to and including 60	1 000
61 ,, 300	2 000
301 „ 500	2 500

TABLE 27 VALUES OF VOLTAGE DROP ACROSS FUSE-LINK

(*Clause* 7.11.4)

Rated Current of Fuse-Link	Voltage Drop	
	Quick-Acting Fuse-Links	Time Lag Fuse-Links
(1)	(2)	(3)
A	mV	mV
0·5	*	*
1	*	*
2	2 000	2 000
4	1 000	1 000
6	450	325
10	450	225
16	370	185
20	330	165
25	300	155
35	270	145
50	240	140
63	220	130
80	200	130
100	190	130

*Under consideration.

TABLE 28 NOMINAL CONDUCTOR SIZES FOR FUSING TEST

(*Clause* 7 12 2)

Rated Current of Fuse-Base	Nominal Cross-Sectional Area of Conductors	Minimum Length of Conductor per Terminal
(1)	(2)	(3)
A	mm^2	m
Up to and including 25	6	2
Over 25 up to and including 63	25	1
Over 63 up to and including 100	50	1 25

TABLE 29 TEST CURRENTS FOR FUSING TEST

(*Clauses* 7 12 4, 7 12 5, 7 12 9 1 *and* 7 12 9 2)

Rated Current, I_n, of Fuse-Link	Smaller Test Current	Larger Test Current	Testing Period
(1)	(2)	(3)	(4)
A	A	A	hours
Up to and including 4	1 5 I_n	2 1 I_n	1
Over 4 up to and including 10	1·5 I_n	1 9 I_n	1
„ 10 „ „ „ „ 25	1 4 I_n	1 75 I_n	1
„ 25 „ „ „ „ 63	1 3 I_n	1 6 I_n	1
„ 63 „ „ „ „ 100	1 3 I_n	1 6 I_n	2

TABLE 30 PRE-ARCING TIME

(*Clause* 7.12.6)

Rated Current of Fuse-Link	Pre-arcing Time, *Min*
(1) A	(2) second
Up to and including 4	0·05
Over 4 up to and including 10	0 10
„ 10 „ „ „ 25	0 15
„ 25 „ „ „ 63	0 20
„ 63 „ „ „ 100	0 35

TABLE 31 CHARACTERISTICS OF TEST CIRCUIT

(*Clause* 7.13 5)

Rated Current of Fuse-Link	AC		DC	
	Prospective Current	Power Factor (lag)	Prospective Current	Time Constant
(1) A	(2) A	(3)	(4) A	(5) second
Up to and including 25	4 000	$0\ 3^{+0}_{-0\cdot1}$	1 600	0 003 + 20%
Over 25 up to and including 63	8 000	$0\ 3^{+0}_{-0\cdot1}$	4 000	0·007 + 20%
Over 63 up to and including 100	16 000	$0\cdot3^{+0}_{-0\cdot1}$	8 000	0·015 + 20%

TABLE 32 PROSPECTIVE CURRENT VALUES

(*Clause* 7.13.6)

Rated Current of Fuse-Link	Prospective Current	
	AC	DC
(1)	(2)	(3)
A	A	A
Up to and including 4	250	375
Over 4 up to and including 10	500	750
„ 10 „ „ „ „ 20	1 000	—
„ 20 „ „ „ „ 25	2 000	—
„ 25 „ „ „ „ 35	2 500	—
„ 35 „ „ „ „ 50	3 500	—
„ 50 „ „ „ „ 63	4 500	—
„ 63 „ „ „ „ 80	6 500	—
„ 80 „ „ „ „ 100	9 000	—

NOTE — A dash means that no test is made because the prospective current is comparable to, or greater than the value shown in Table 31.

APPENDIX A

(*Clause* 7.2.1)

SAMPLING PLAN OF D-TYPE FUSES

A-1. SCALE OF SAMPLING

A-1.1 Lot — In any consignment, all the D-type fuses manufactured by the same factory and during the same period shall be grouped together to constitute a lot.

A-1.2 From each lot a certain number of fuses as specified in Table 33 shall be selected at random and subjected to acceptance tests (*see* **7.2**). For this purpose, IS : 4905-1968* shall be used.

TABLE 33 SAMPLING SCHEME

(*Clauses* A-1.2 *and* A-2.1)

Lot Size	Sample Size		N_1+N_2	C_1	C_2	C_3
	First Stage N_1	Second Stage N_2				
N						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 001 to 3 000	32	32	64	2	5	6
3 001 to 10 000	50	50	100	3	7	8
10 001 and above	80	80	160	5	9	12

A-2. NUMBER OF SAMPLES AND CRITERIA FOR CONFORMITY

A-2.1 In Table 33 'N_1' is the size of the first stage sample. A sample shall be declared defective if it fails in one or more of the acceptance tests. If the number of defectives found in this sample is less than or equal to C_1, the lot shall be considered as conforming to this standard and accepted. If the number of defectives is greater than or equal to C_2, the lot shall be rejected. If the number of defectives is between C_1 and C_2, further sample of N_2 size shall be selected at random and subjected to acceptance tests. If the number of defectives in the two samples combined is less than or equal to C_3, the lot shall be accepted, otherwise rejected.

*Methods for random sampling.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Conversion*
Force	newton	N	1 N = 1 kg 1 m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

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Printed at Sree Saraswaty Press Ltd Calcutta India